TOGFTO" 8h099260

FIG. 1

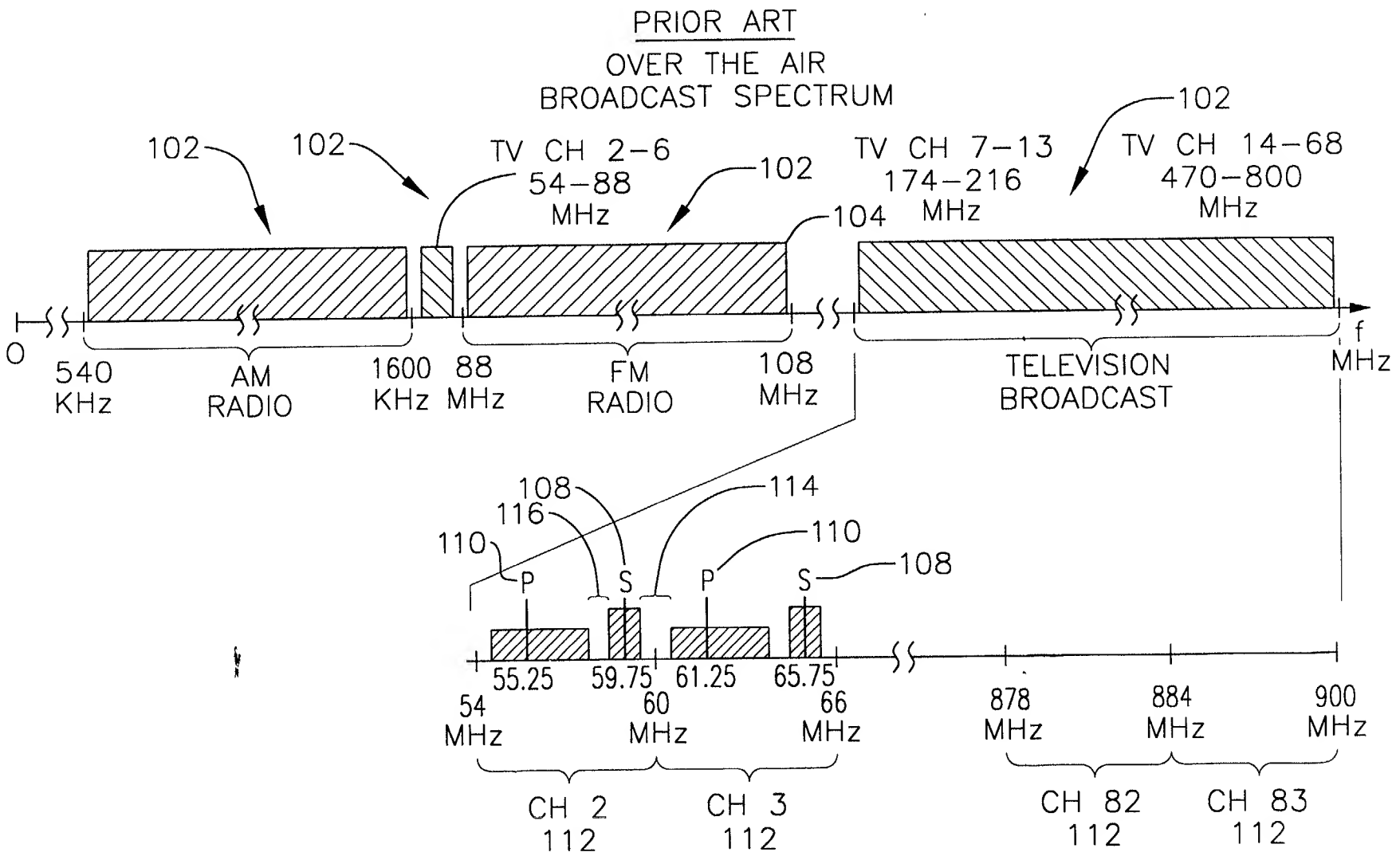


FIG. 2

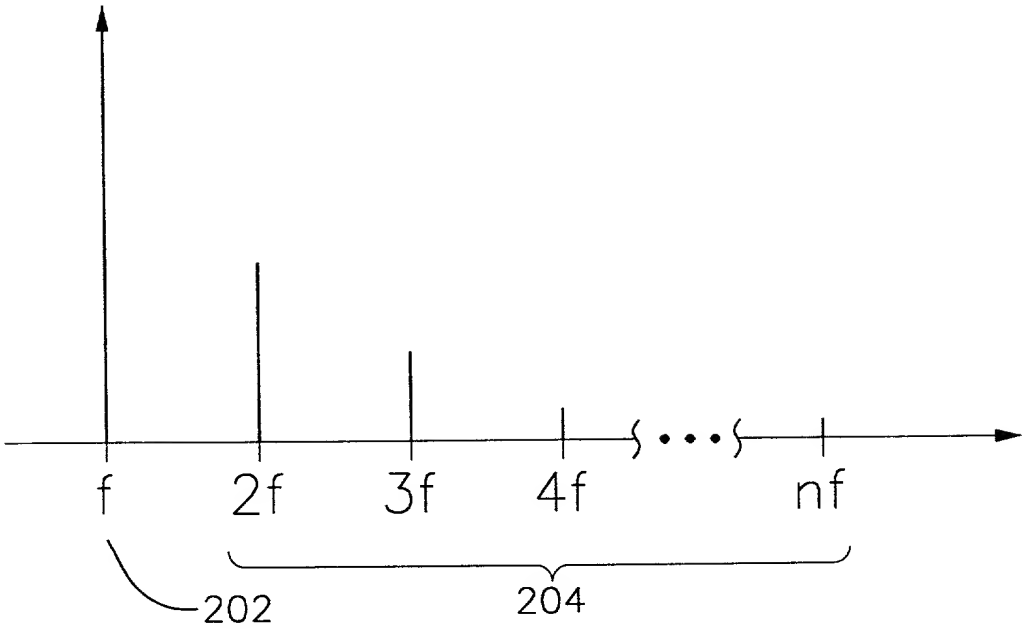
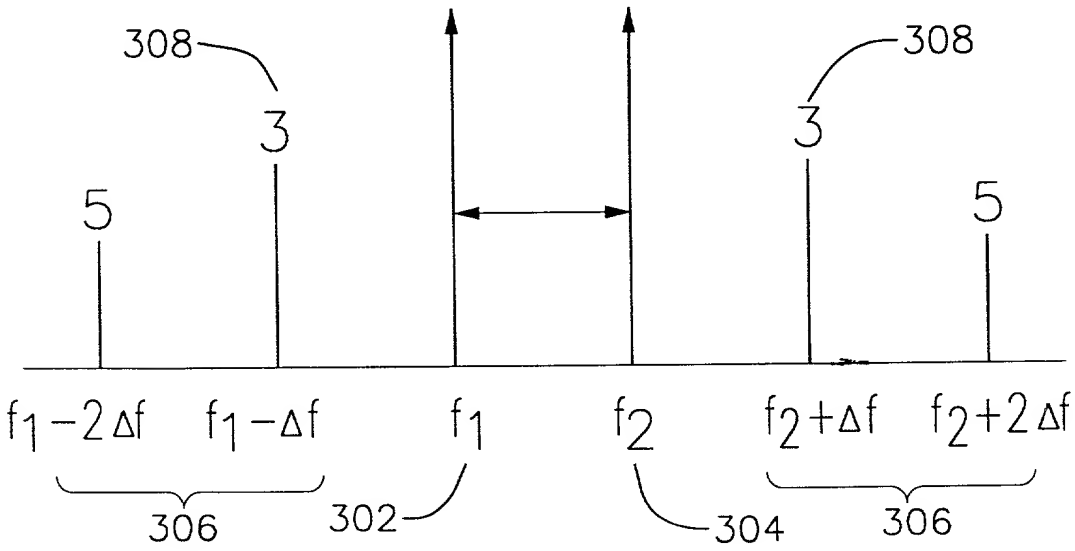


FIG. 3

PRIOR ART



TOSTD" 8h099260

FIG. 4
PRIOR ART

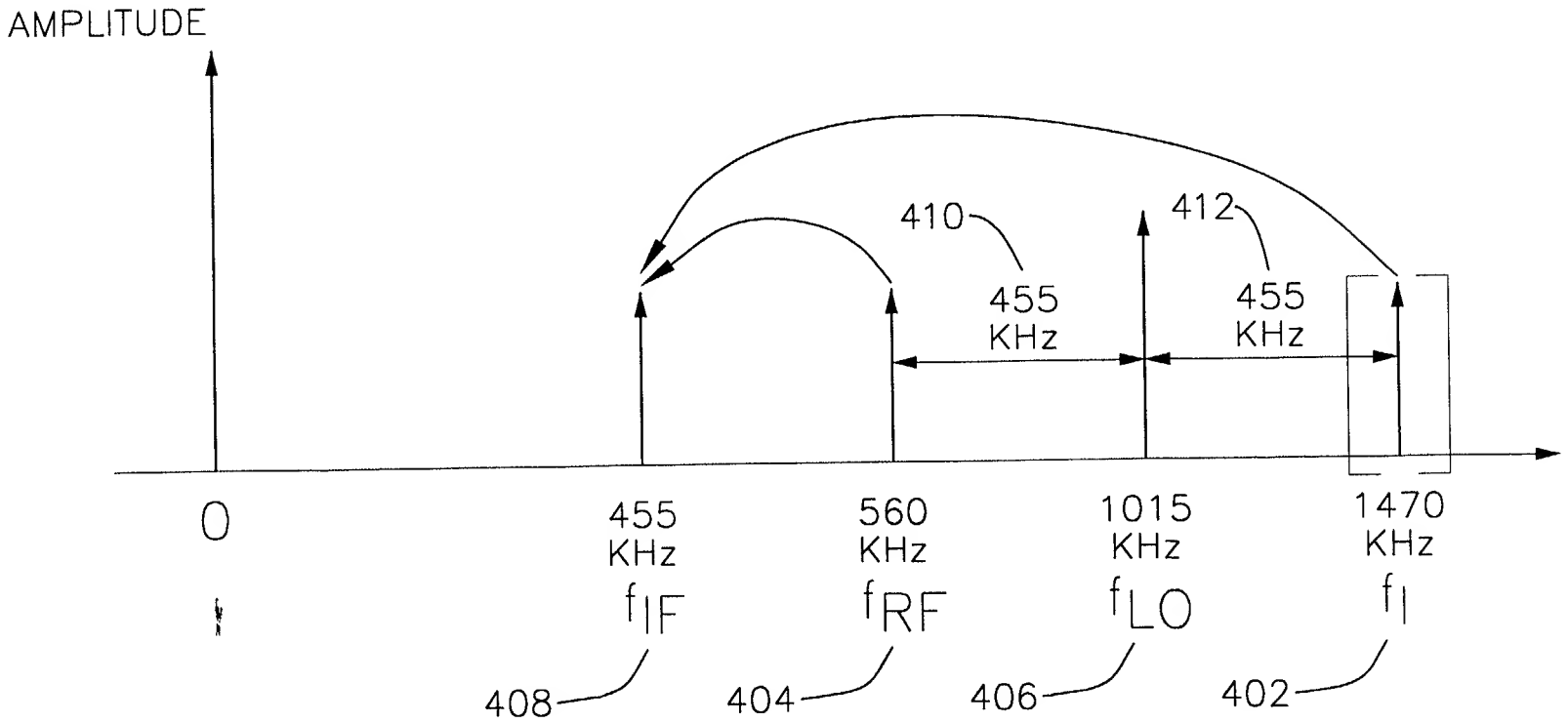
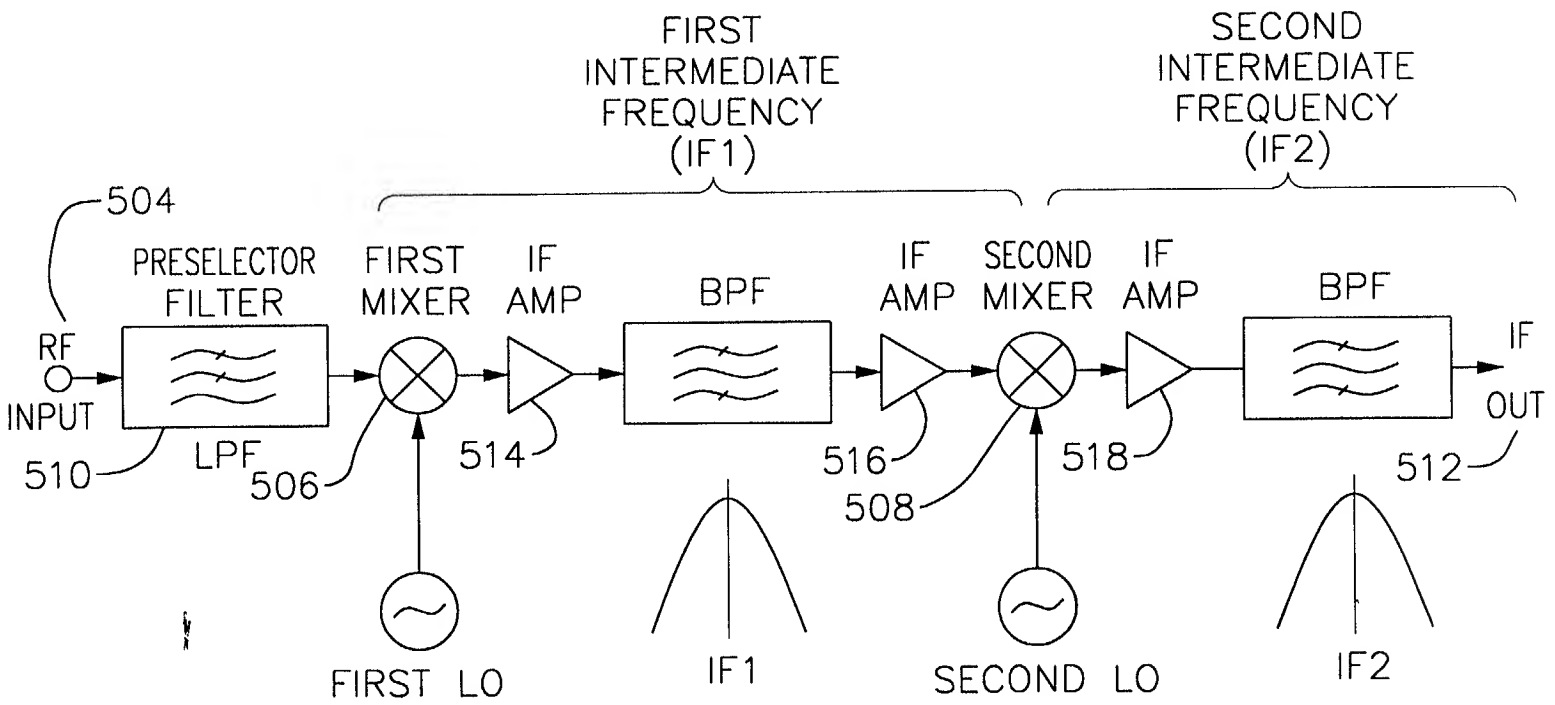


FIG.5

DUAL CONVERSION RECEIVER



IF2<RFINPUT<IF1

FIG. 6

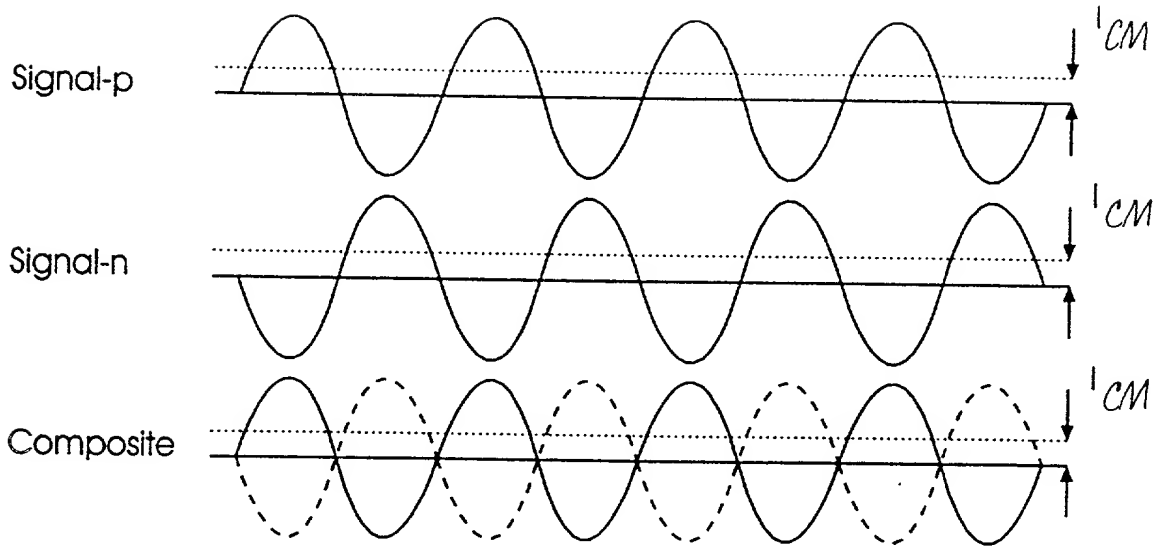

Signal-p
Signal-n
Composite
I_{CM}
I_{CM}
I_{CM}

FIG. 7

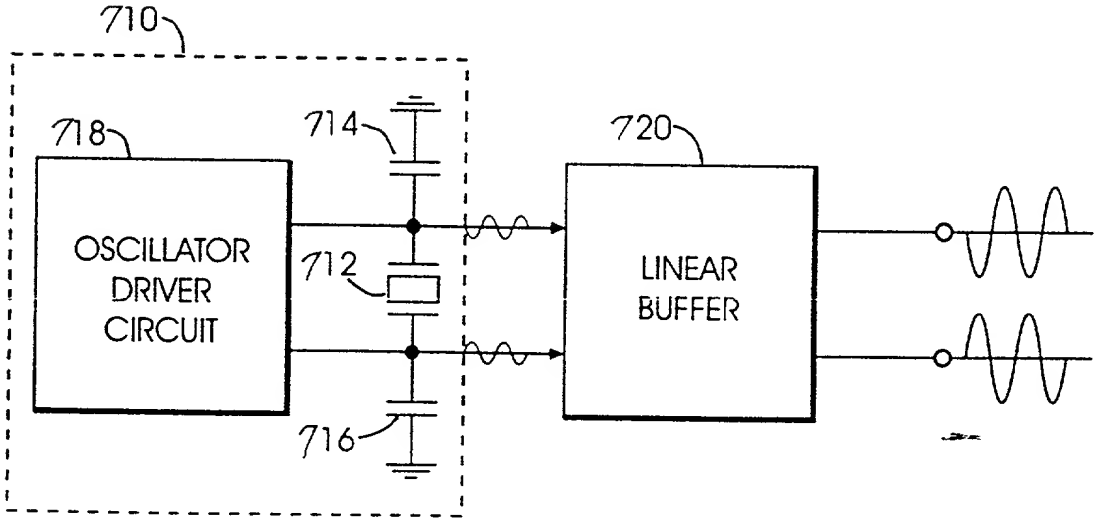

710
718
714
720
OSCILLATOR DRIVER CIRCUIT
712
LINEAR BUFFER
716

FIG. 8

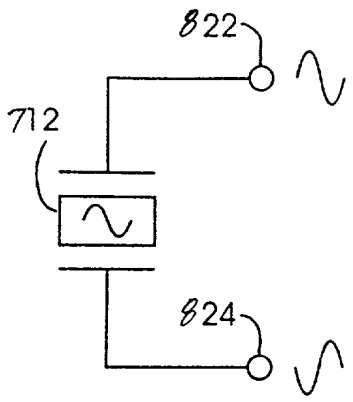


FIG. 9

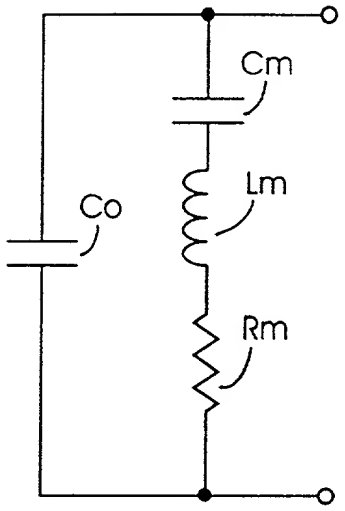


FIG. 10

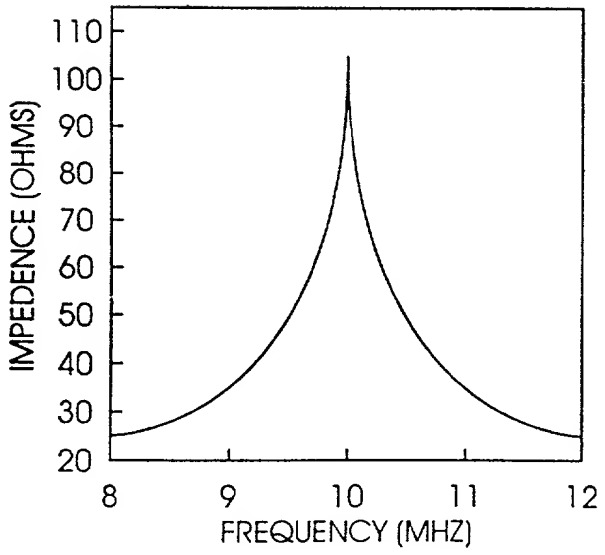


FIG. 11

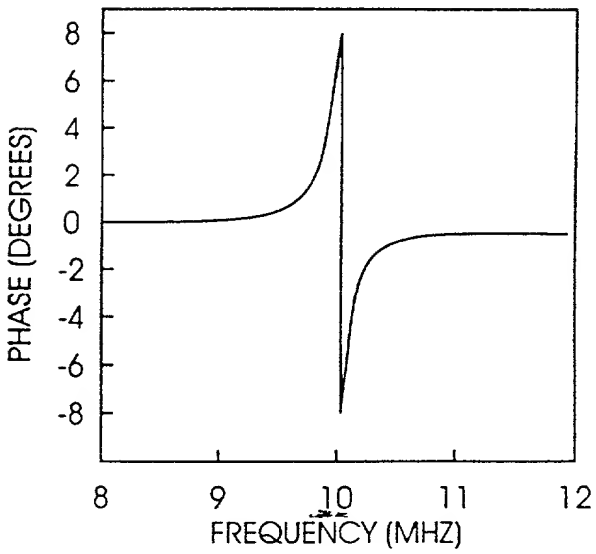


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FIG. 12

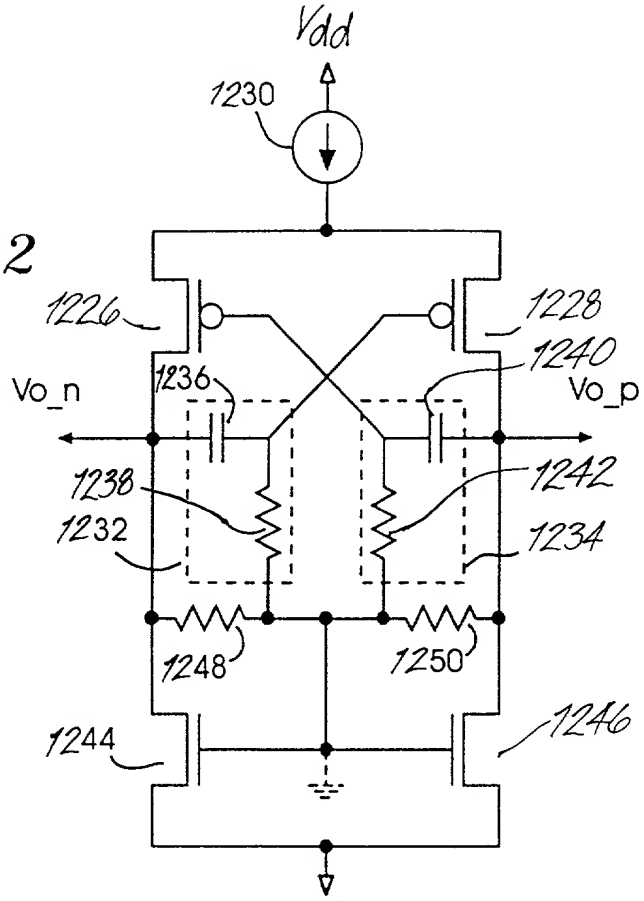


FIG. 13

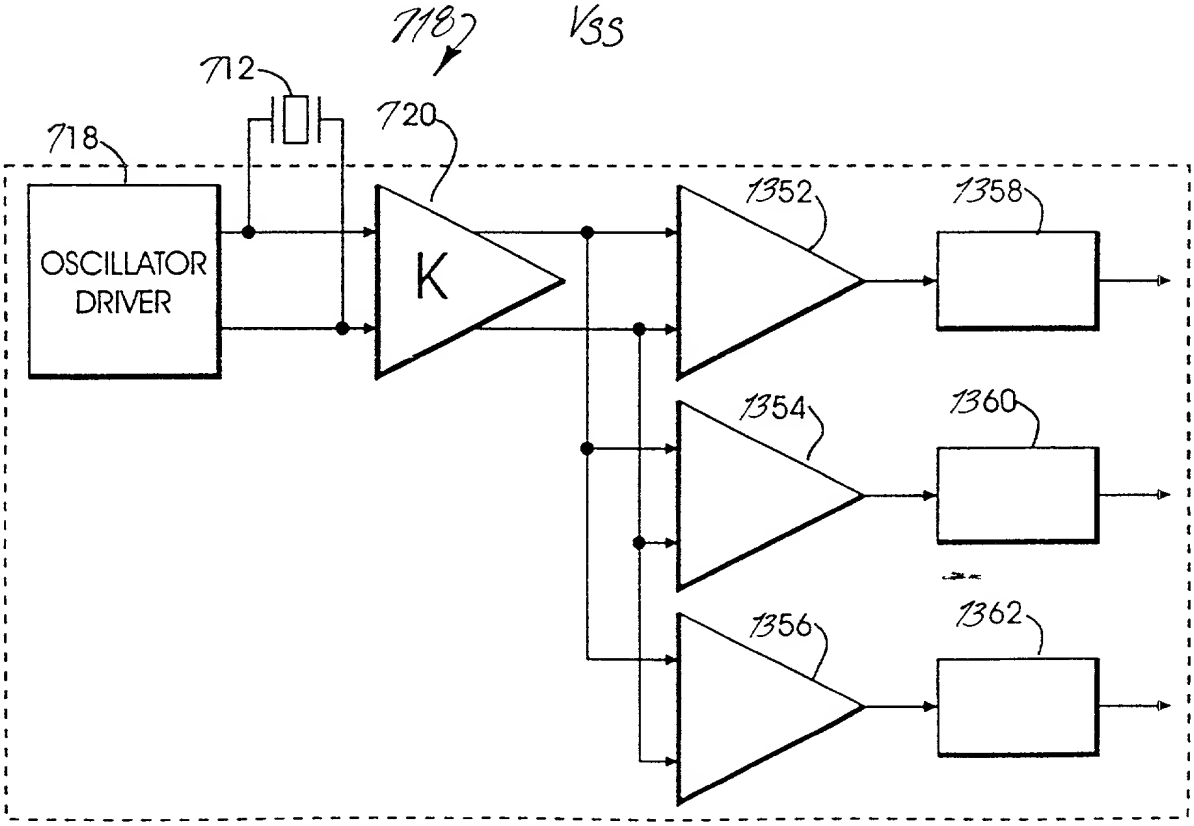
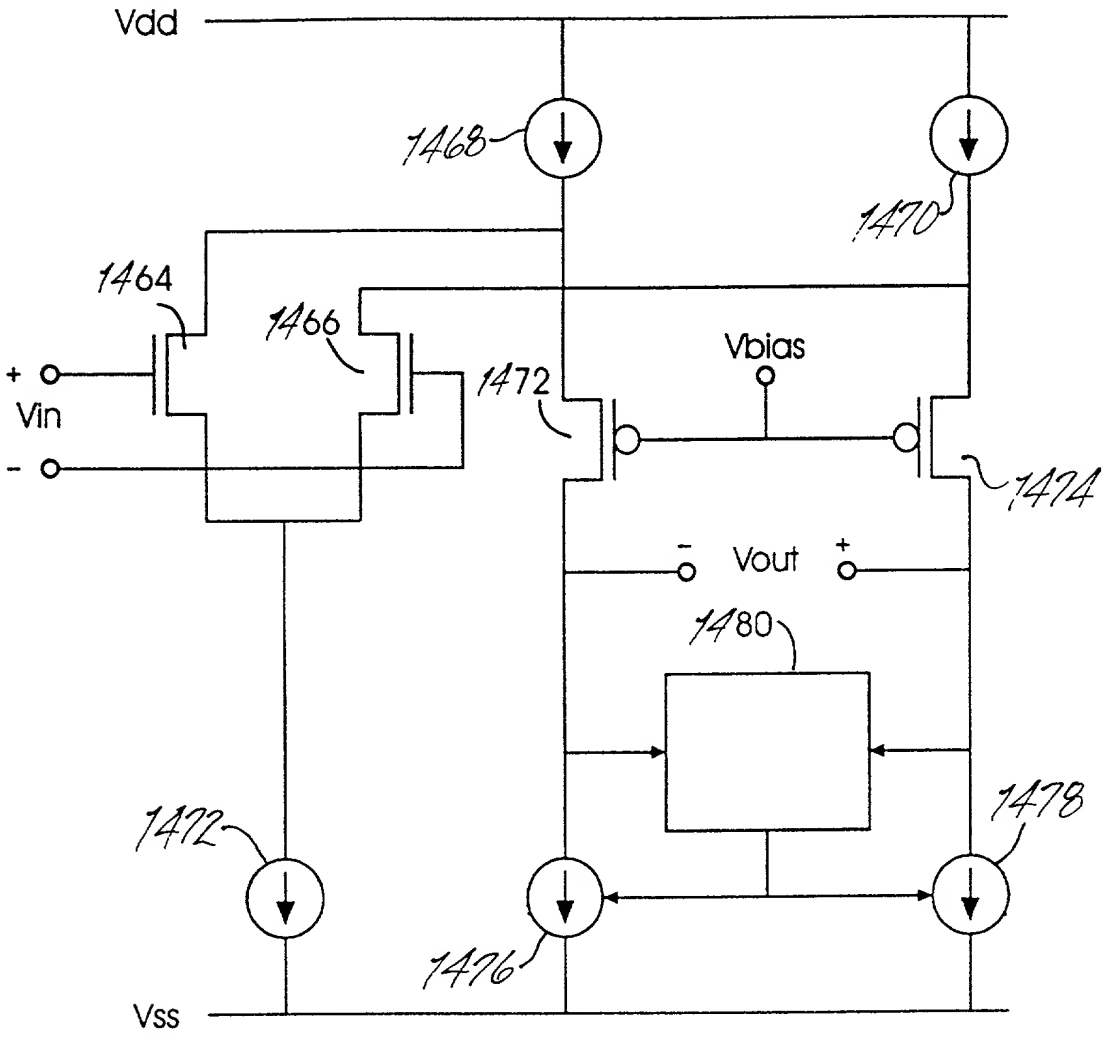


FIG. 14


Vdd
1468
1470
1464
1466
Vbias
+
Vin
-
1472
1474
-
Vout
+
1480
1472
1478
1476
Vss

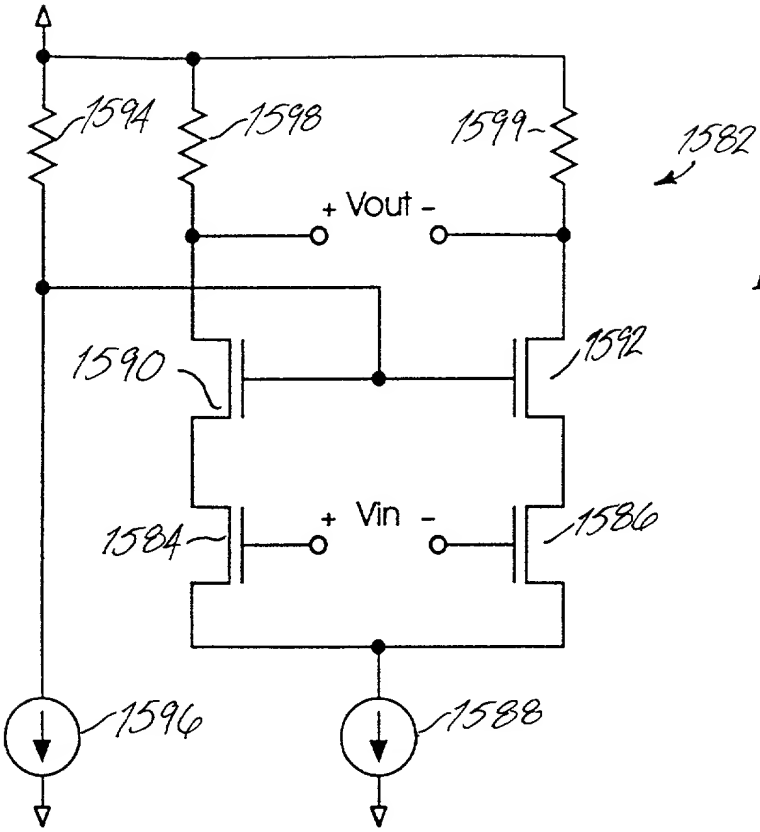

1594
1598
1599
1582
+ Vout -
1590
1592
+ Vin -
1584
1586
1596
1588

FIG. 15

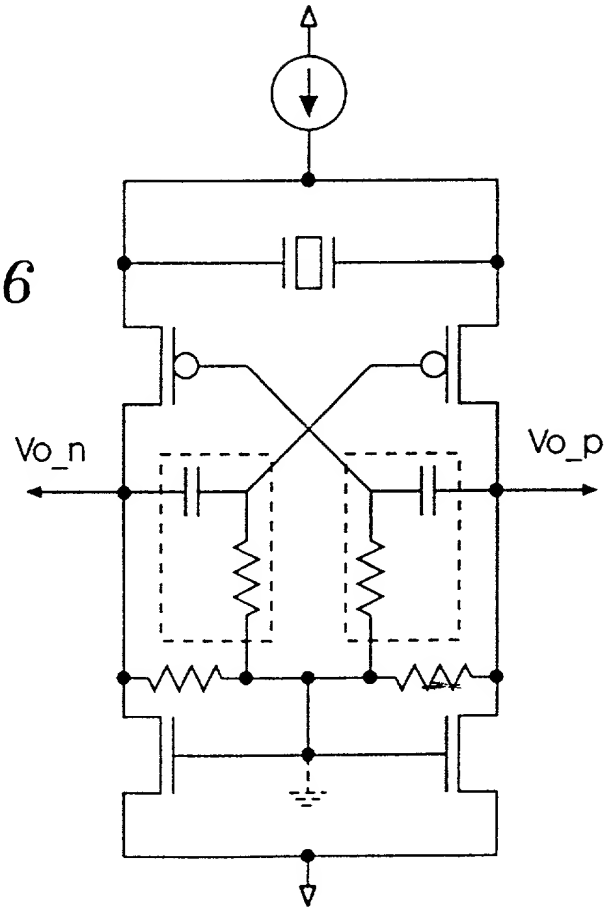

Vo_n
Vo_p

FIG. 16

FIG. 17

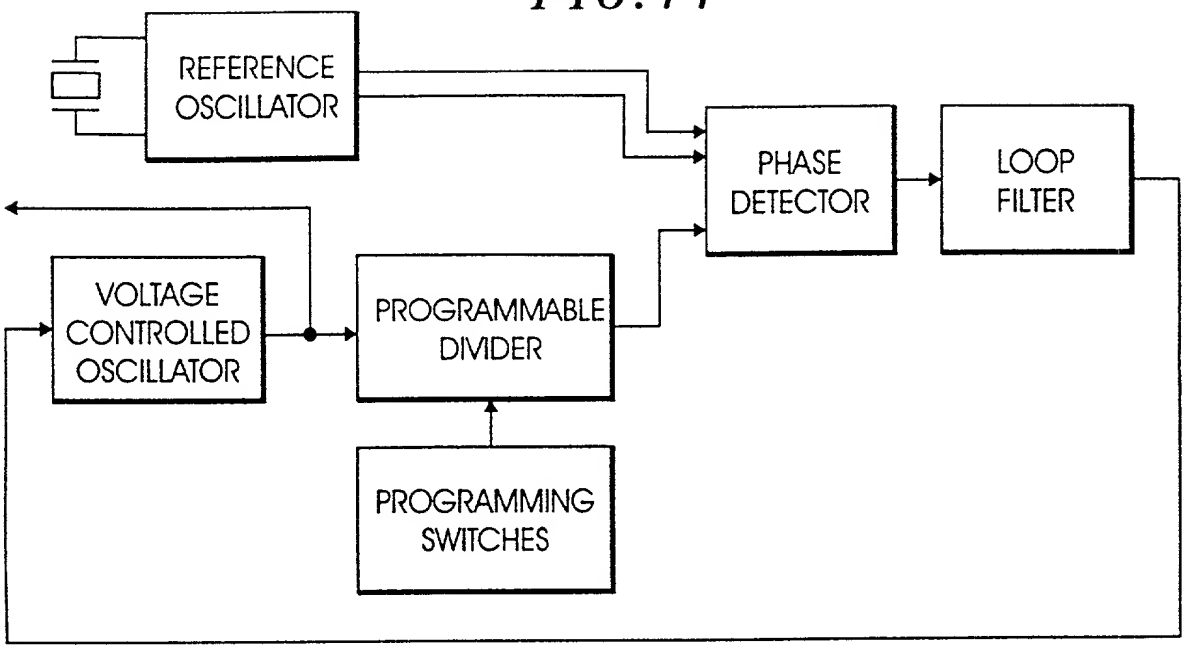

REFERENCE OSCILLATOR
PHASE DETECTOR
LOOP FILTER
VOLTAGE CONTROLLED OSCILLATOR
PROGRAMMABLE DIVIDER
PROGRAMMING SWITCHES

FIG. 18

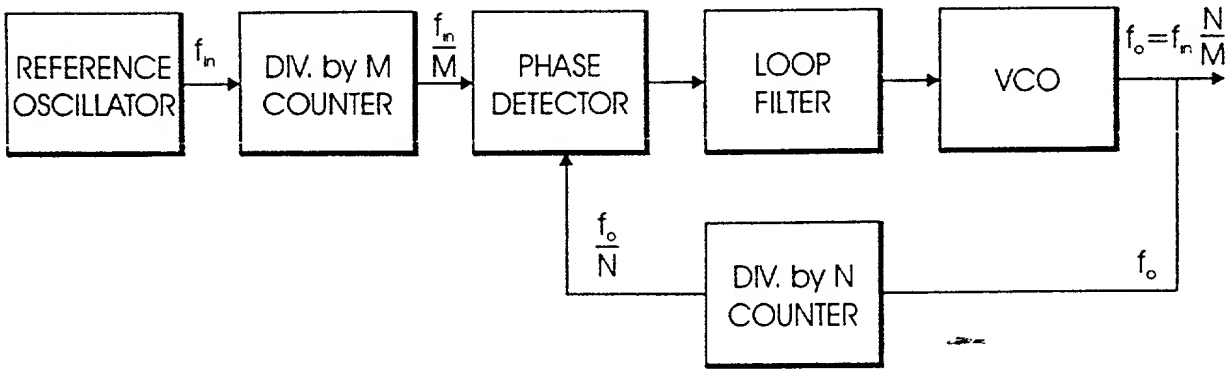

REFERENCE OSCILLATOR
f_{in}
DIV. by M COUNTER
$\frac{f_{in}}{M}$
PHASE DETECTOR
LOOP FILTER
VCO
$f_o = f_{in} \frac{N}{M}$
$\frac{f_o}{N}$
DIV. by N COUNTER
f_o

FIG. 19

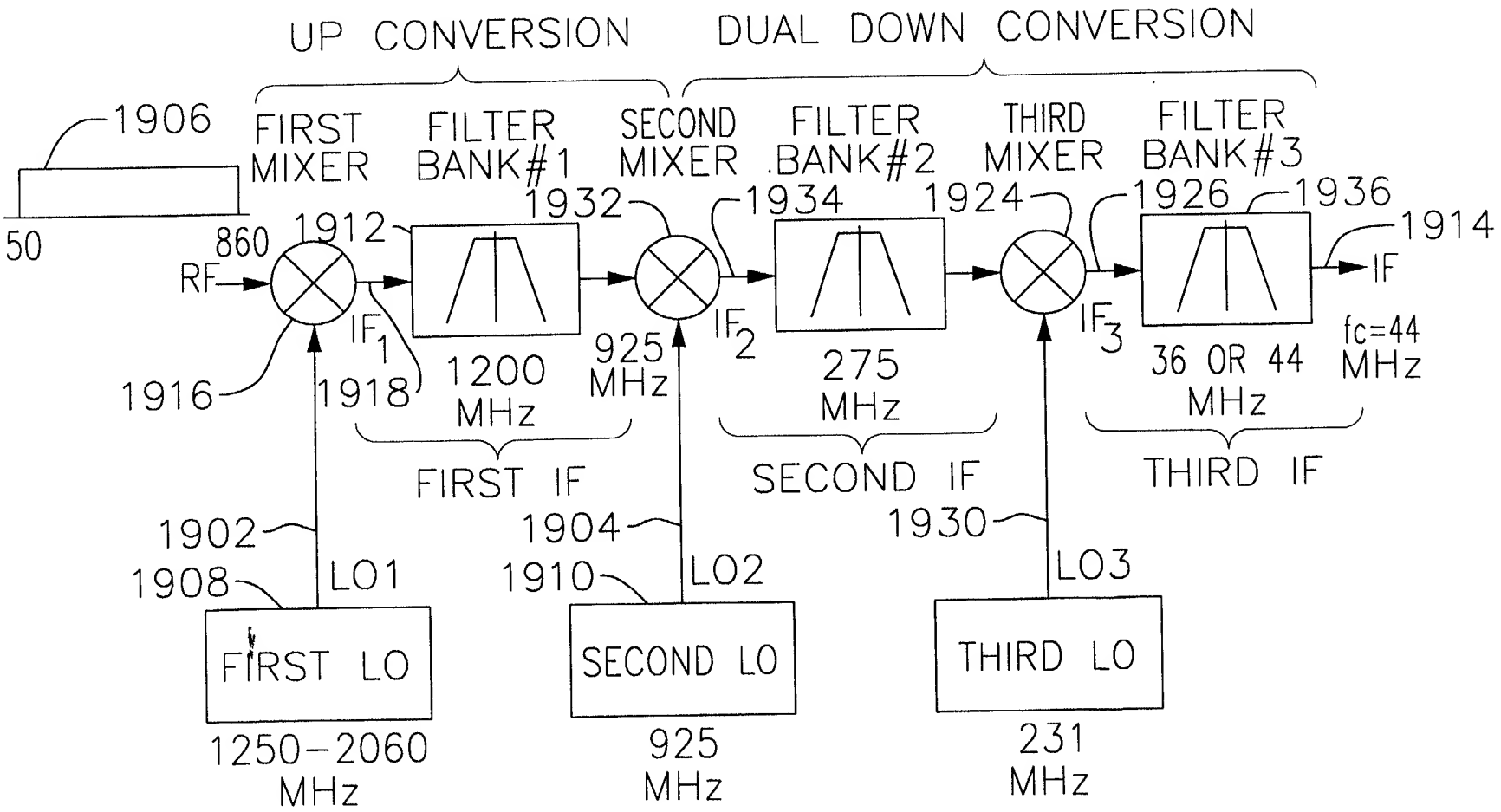

UP CONVERSION
DUAL DOWN CONVERSION
1906
FIRST MIXER
FILTER BANK#1
SECOND MIXER
FILTER BANK#2
THIRD MIXER
FILTER BANK#3
50
860
RF
1912
1932
1934
1924
1926
1936
1914
IF
IF1
IF2
IF3
1916
1918
1200 MHz
925 MHz
275 MHz
36 OR 44 MHz
fc=44 MHz
FIRST IF
SECOND IF
THIRD IF
1902
1904
1930
1908
1910
LO1
LO2
LO3
FIRST LO
SECOND LO
THIRD LO
1250–2060 MHz
925 MHz
231 MHz

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FIG.20

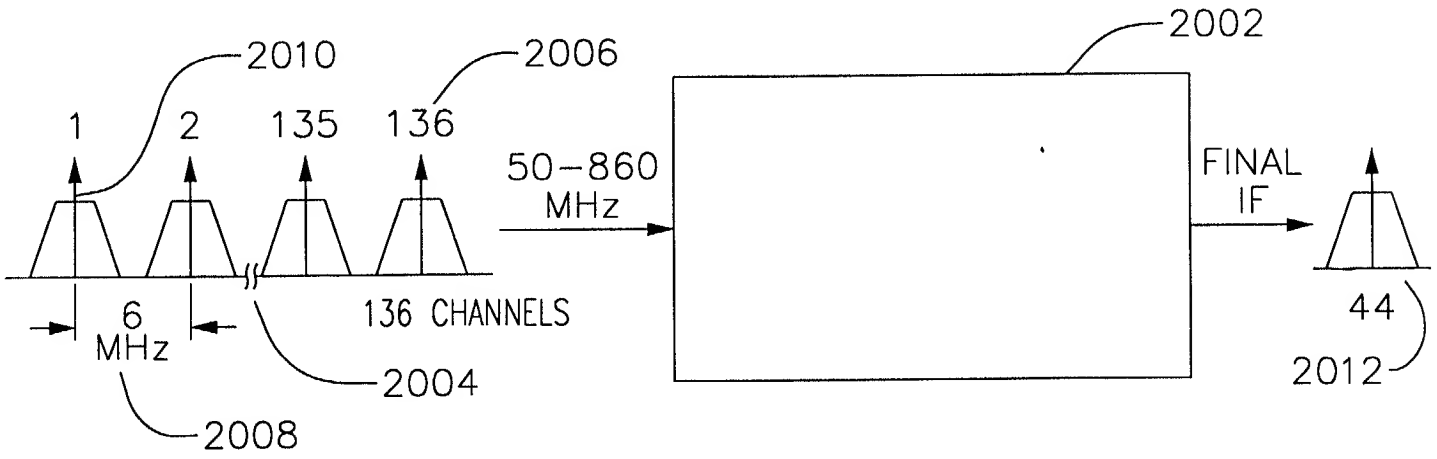

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FIG.21

PPL Xtal REFERENCE=10MHz
LO-1, 10MHz FREQUENCY STEPS
LO-2, 100kHz FREQUENCY STEPS

44MHz IF

TABLE OF FREQUENCIES BASED ON COARSE/FINE PLL SOLUTION:

NOTE
• LO-2 REF=100KHz,
SO DIVIDE RANGE=9216 TO 9280

Frf (MHz)	50	56	62	68	74	80	86	92	98	104	110	116	122	128	"	854	860
LO-1(MHz)	1250	1260	1260	1270	1270	1280	1290	1290	1300	1300	1310	1320	1320	1330	"	2050	2060
IF-1 (MHz)	**1200**	1204	1198	1202	1196	**1200**	1204	1198	1202	1196	**1200**	1204	1198	1202	"	1196	**1200**
LO-2(MHz)	**924.8**	928.0	923.2	926.4	921.6	**924.8**	928.0	923.2	926.4	921.6	**924.8**	928.0	923.2	926.4	"	921.6	**924.8**
IF-2(MHz)	**275.2**	276.0	274.8	275.6	274.4	**275.2**	276.0	274.8	275.6	274.4	**275.2**	276.0	274.8	275.6	"	274.4	**275.2**
LO-3(MHz)	231.2	232	230.8	232	230	231	232	231	232	230	231	232	231	232	"	230	231
IF-3(MHz)	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	"	44.0	44.0

2102

FIG.22

PPL Xtal REFERENCE=10MHz
LO-1, 10MHz FREQUENCY STEPS
LO-2, 100kHz FREQUENCY STEPS

36MHz IF

TABLE OF FREQUENCIES BASED ON COARSE/FINE PLL SOLUTION:

NOTE
• LO-2 REF=100KHz,
SO DIVIDE RANGE=9280 TO 9340

Frf (MHz)	50	58	66	74	82	90	98	106	114	122	130	138	146	154	"	852	860
LO-1(MHz)	1250	1260	1270	1270	1280	1290	1300	1310	1310	1320	1330	1340	1350	1350	"	2050	2060
IF-1 (MHz)	**1200**	1202	1204	1196	1198	**1200**	1202	1204	1196	1198	**1200**	1202	1204	1196	"	1198	**1200**
LO-2(MHz)	**931.2**	**932.8**	**934.4**	**928.0**	**930**	**931**	**933**	**934**	**928.0**	**930**	**931**	**933**	**934**	**928.0**	"	**929.60**	**931.2**
IF-2(MHz)	**268.8**	269.2	269.6	268.0	268.4	**268.8**	269.2	269.6	268.0	268.4	**268.8**	269.2	269.6	268.0	"	268.4	**268.8**
LO-3(MHz)	232.8	233.2	233.6	232	232	233	233	234	232	232	233	233	234	232.0	"	232.4	232.8
IF-3(MHz)	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	"	36.0	36.0

FIG.23

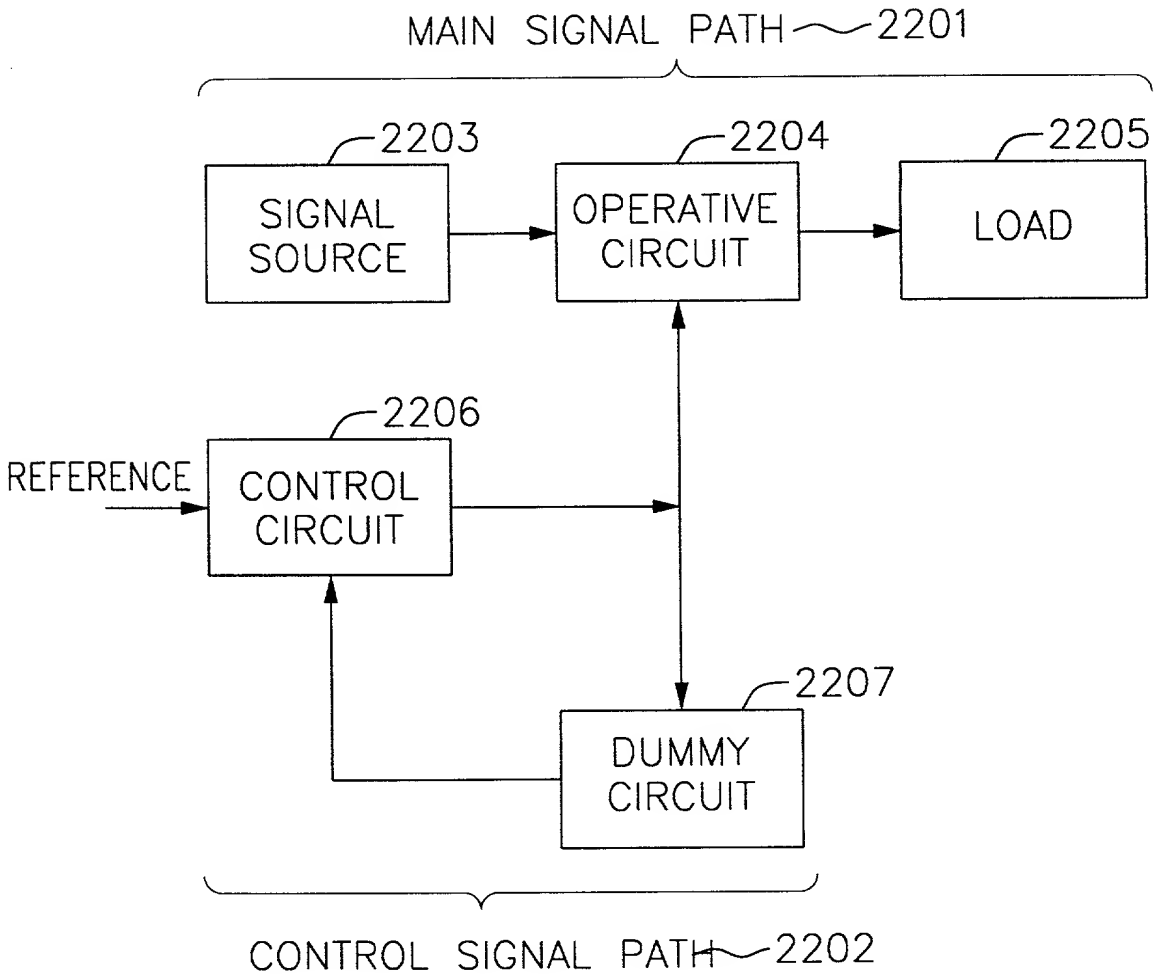
MAIN SIGNAL PATH
2201
2203
SIGNAL SOURCE
2204
OPERATIVE CIRCUIT
2205
LOAD
2206
REFERENCE
CONTROL CIRCUIT
2207
DUMMY CIRCUIT
CONTROL SIGNAL PATH
2202

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FIG.24a

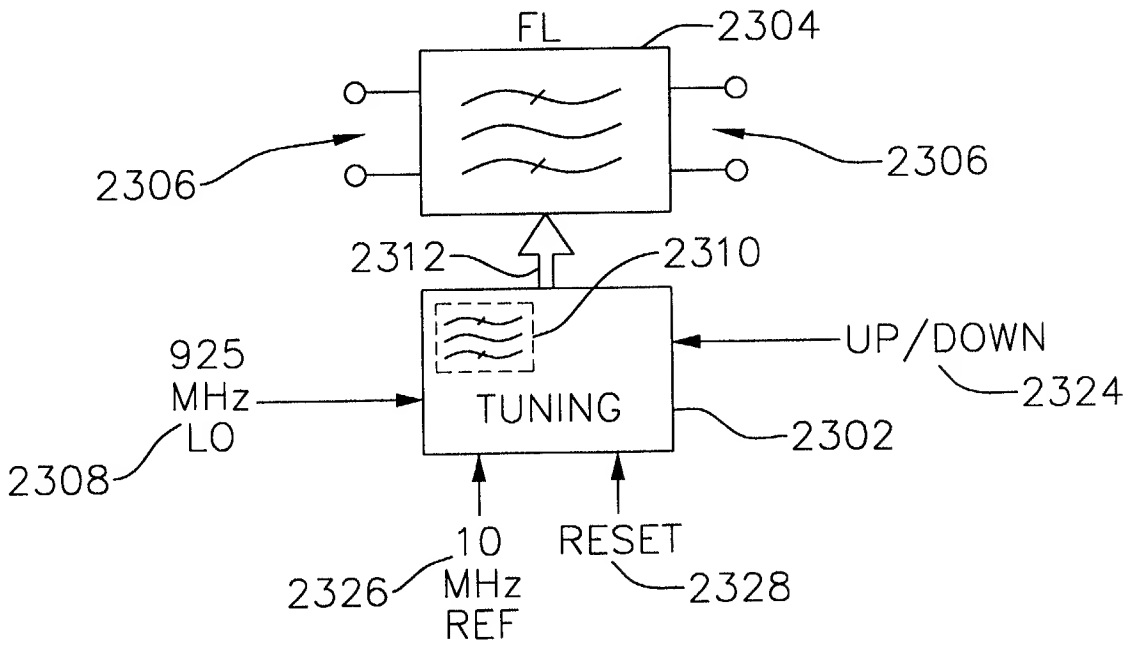

FIG.24b

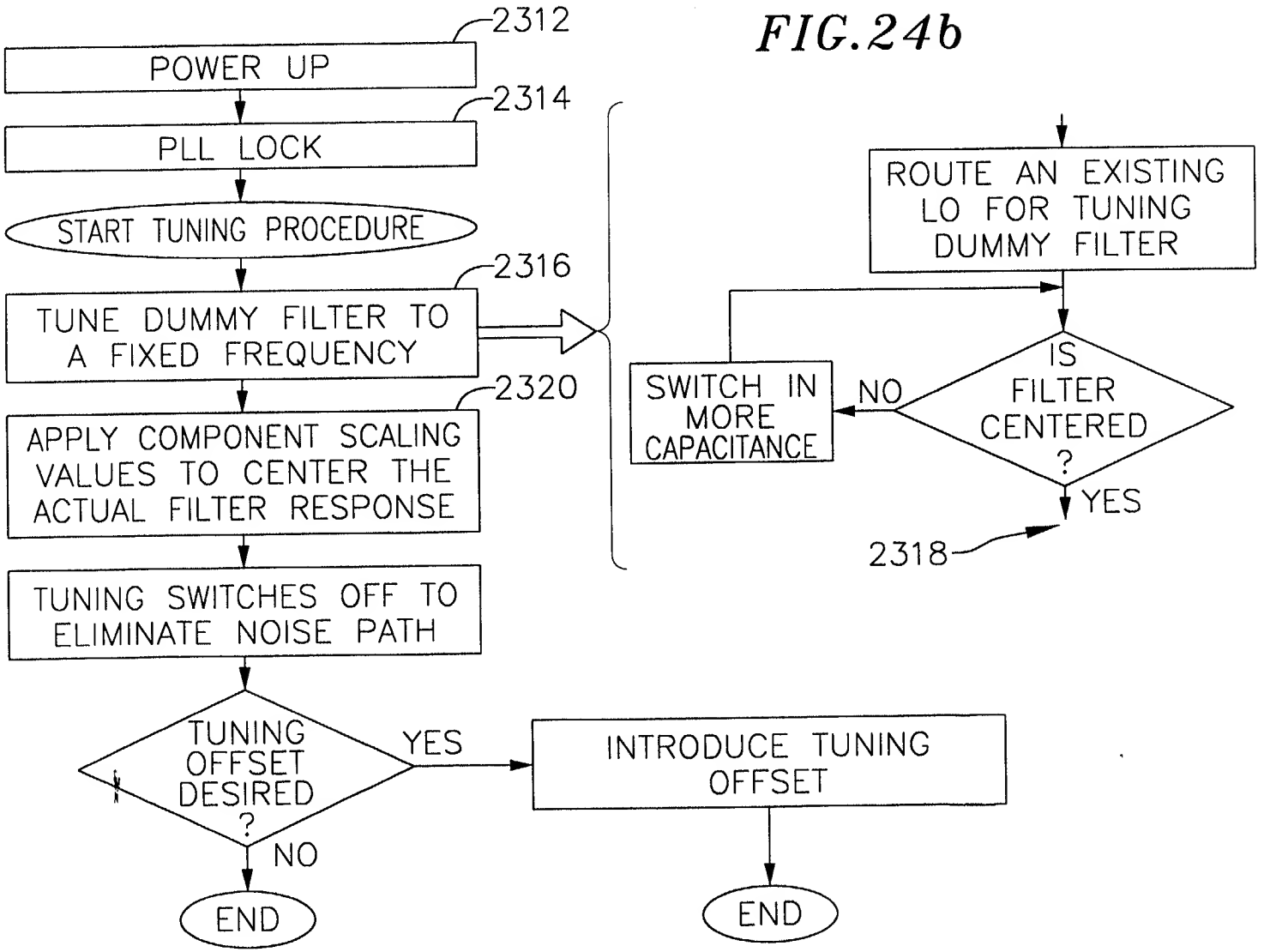
2312
POWER UP
2314
PLL LOCK
START TUNING PROCEDURE
2316
TUNE DUMMY FILTER TO A FIXED FREQUENCY
2320
APPLY COMPONENT SCALING VALUES TO CENTER THE ACTUAL FILTER RESPONSE
TUNING SWITCHES OFF TO ELIMINATE NOISE PATH
TUNING OFFSET DESIRED ?
YES
NO
INTRODUCE TUNING OFFSET
END
END
ROUTE AN EXISTING LO FOR TUNING DUMMY FILTER
IS FILTER CENTERED ?
NO
SWITCH IN MORE CAPACITANCE
YES
2318

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FIG.24c

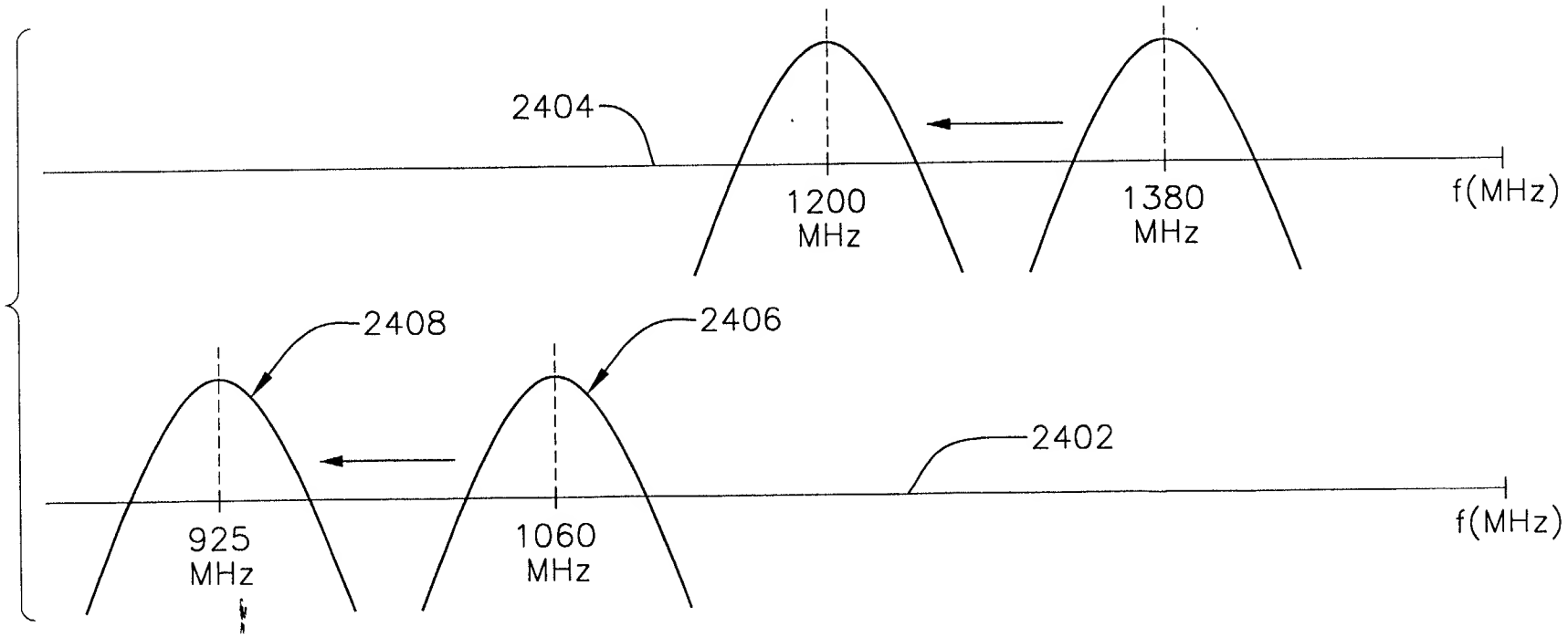

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FIG.25

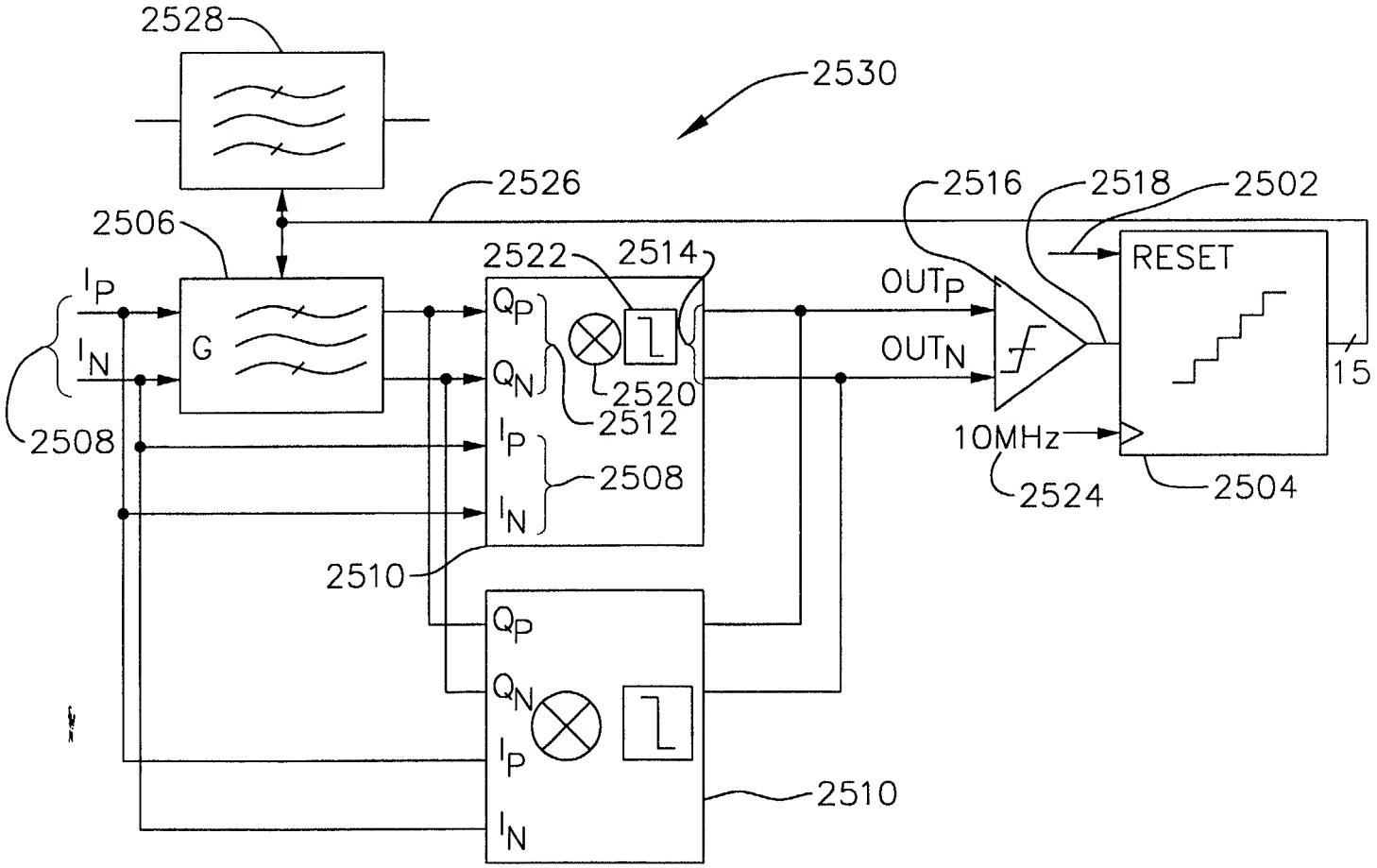

FIG.26

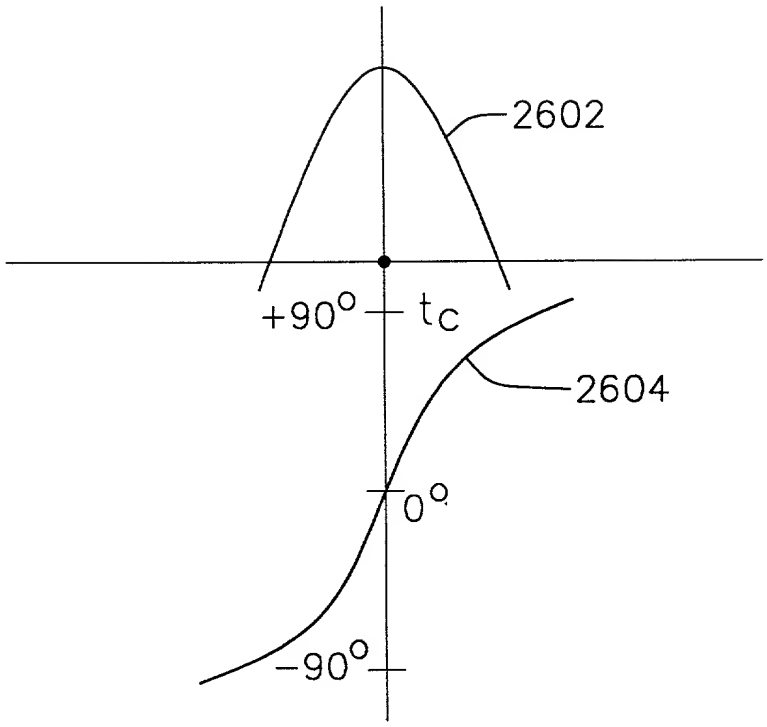

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FIG.27

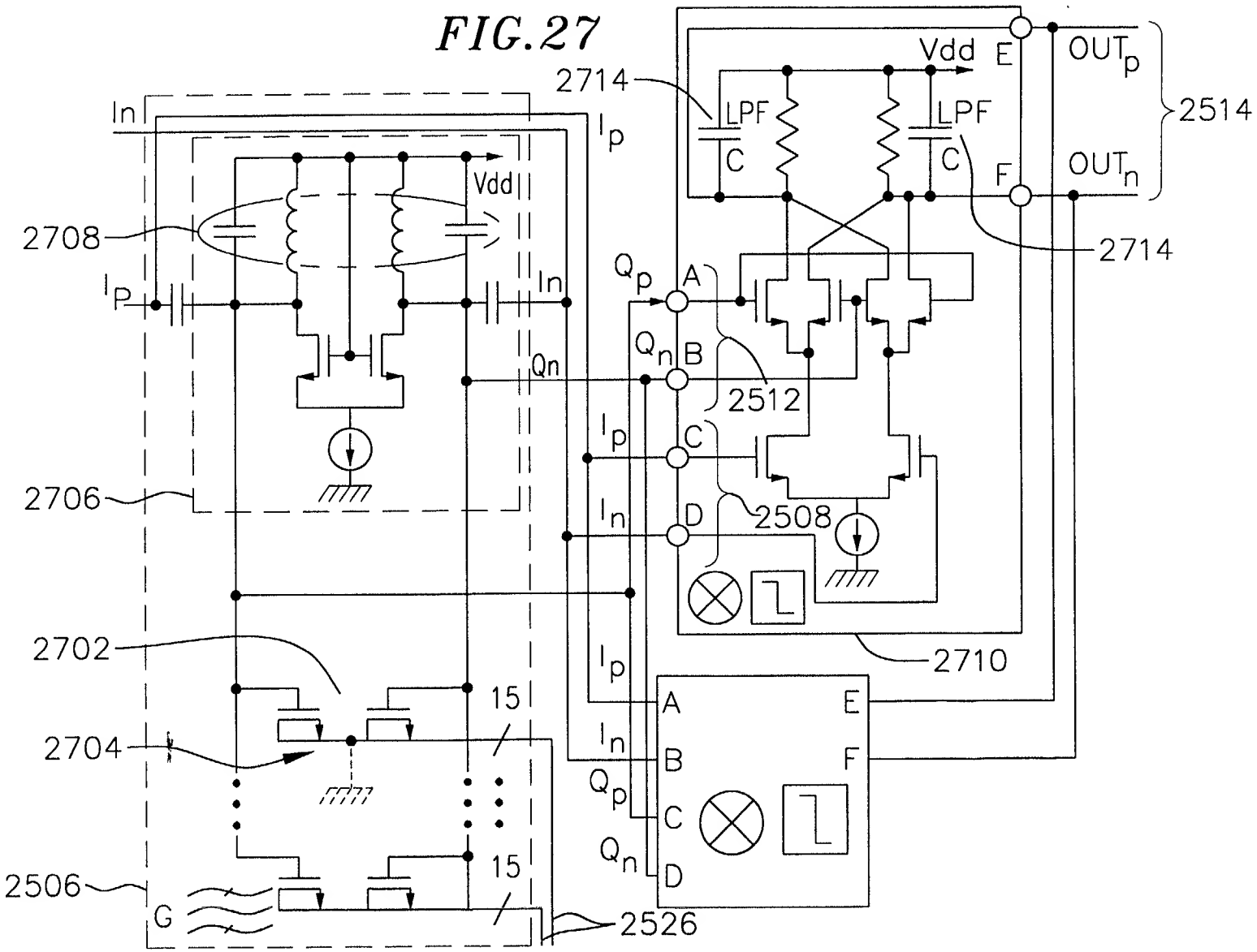

FIG.28

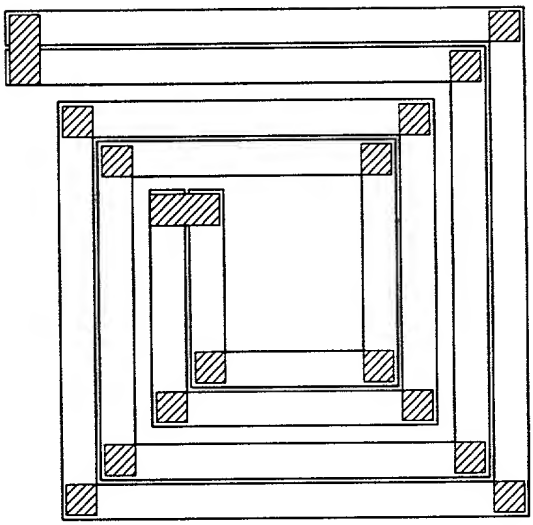

FIG. 29

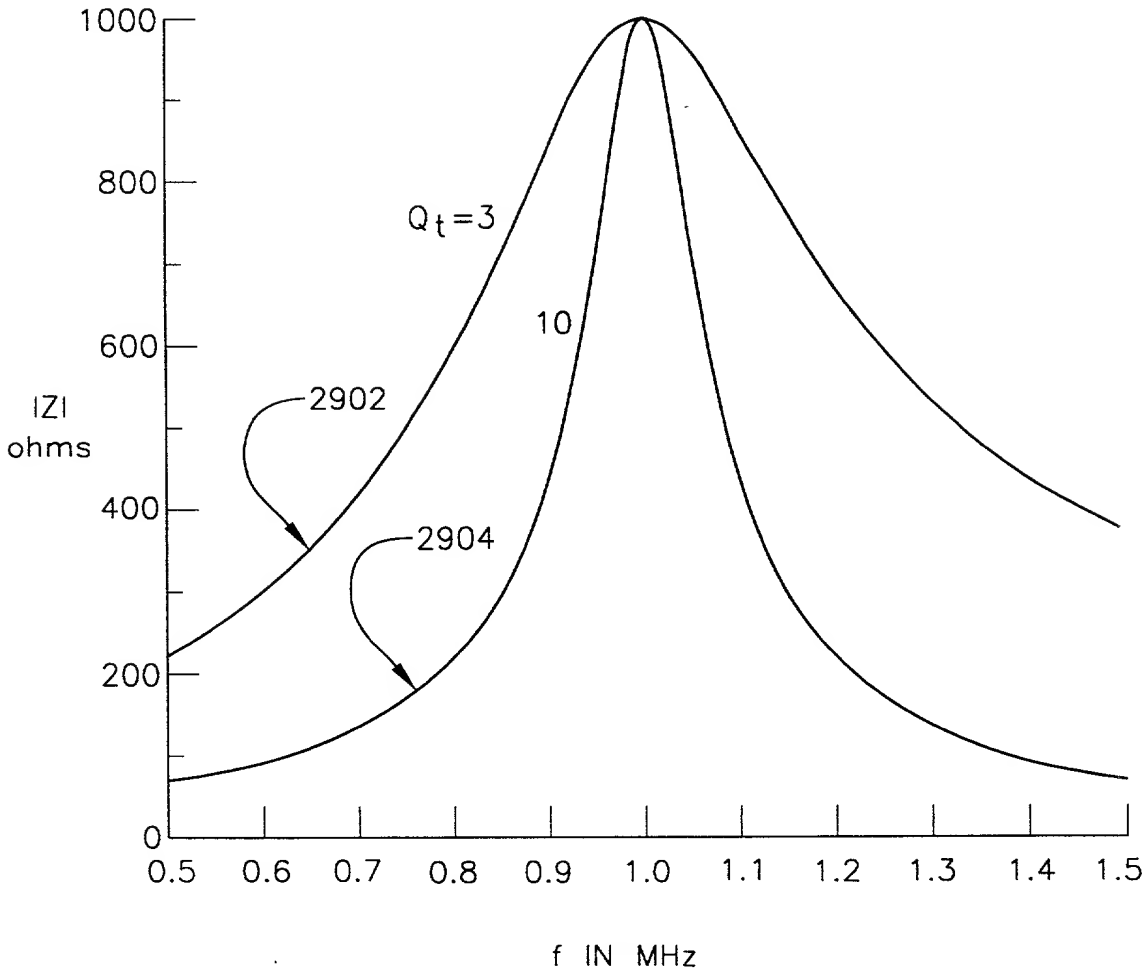
1000
800
600
400
200
0
|Z|
ohms
Q_t=3
10
2902
2904
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
f IN MHz

FIG.30

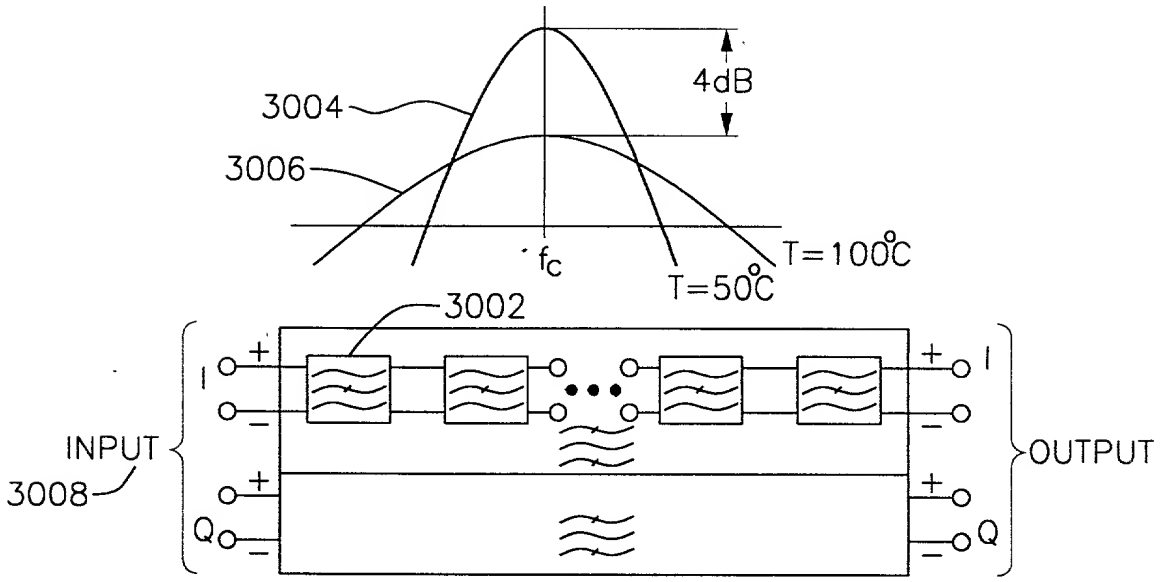
4dB
3004
3006
fc
T=100°C
T=50°C
3002
INPUT
3008
I
Q
OUTPUT

FIG.31

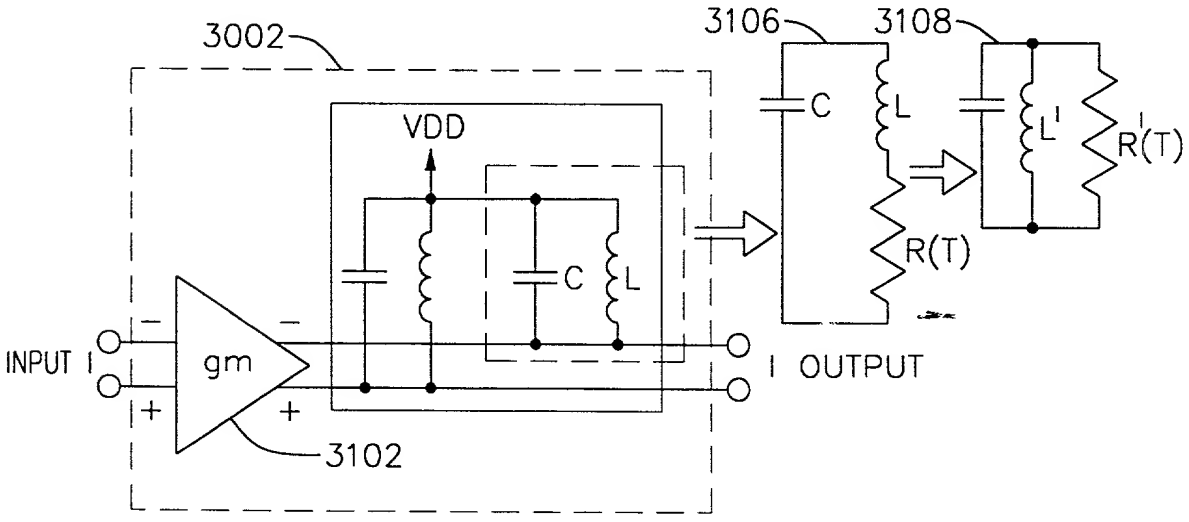
3002
3106
3108
VDD
C
L
gm
INPUT I
3102
R(T)
I OUTPUT

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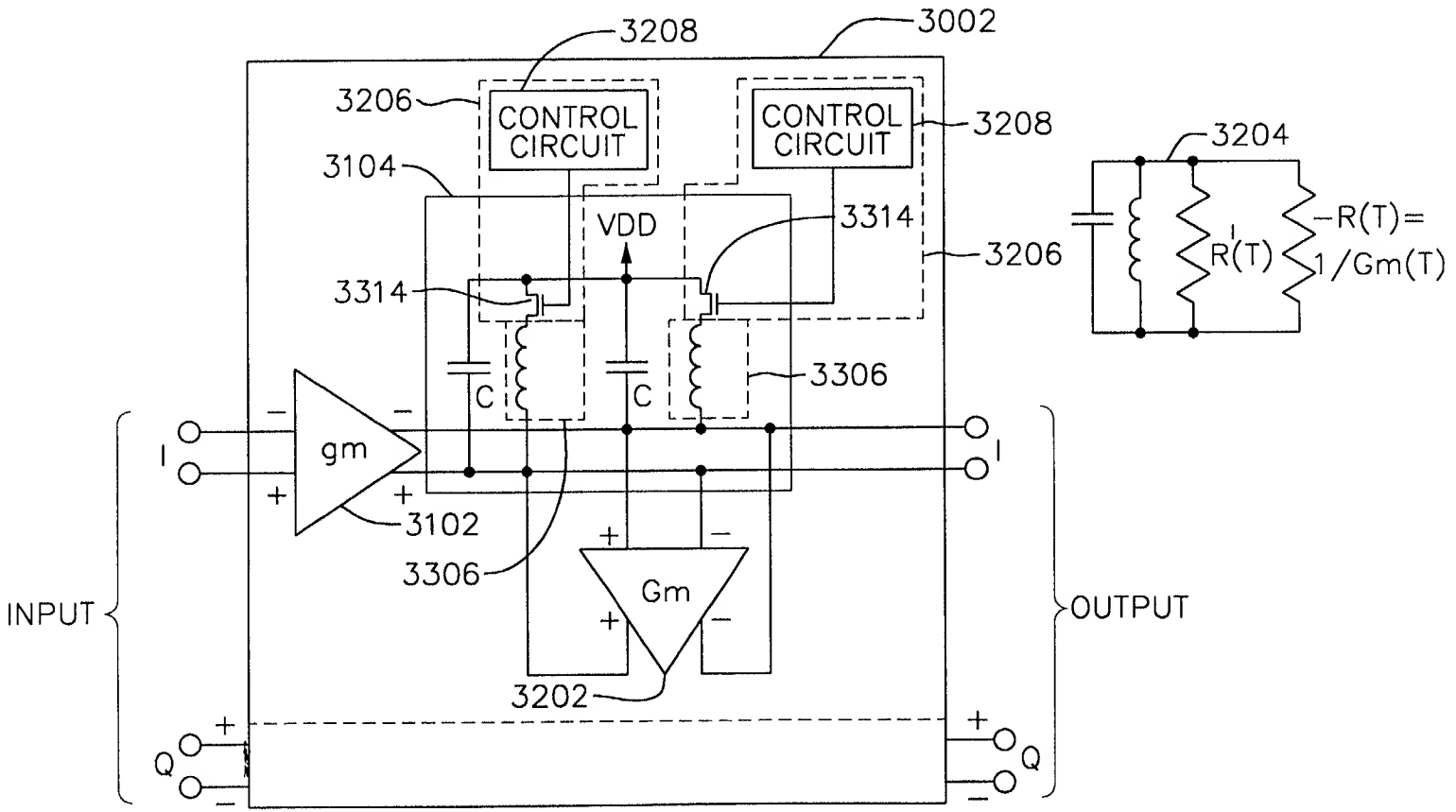
FIG.32



FOSTER 94089460

FIG.33

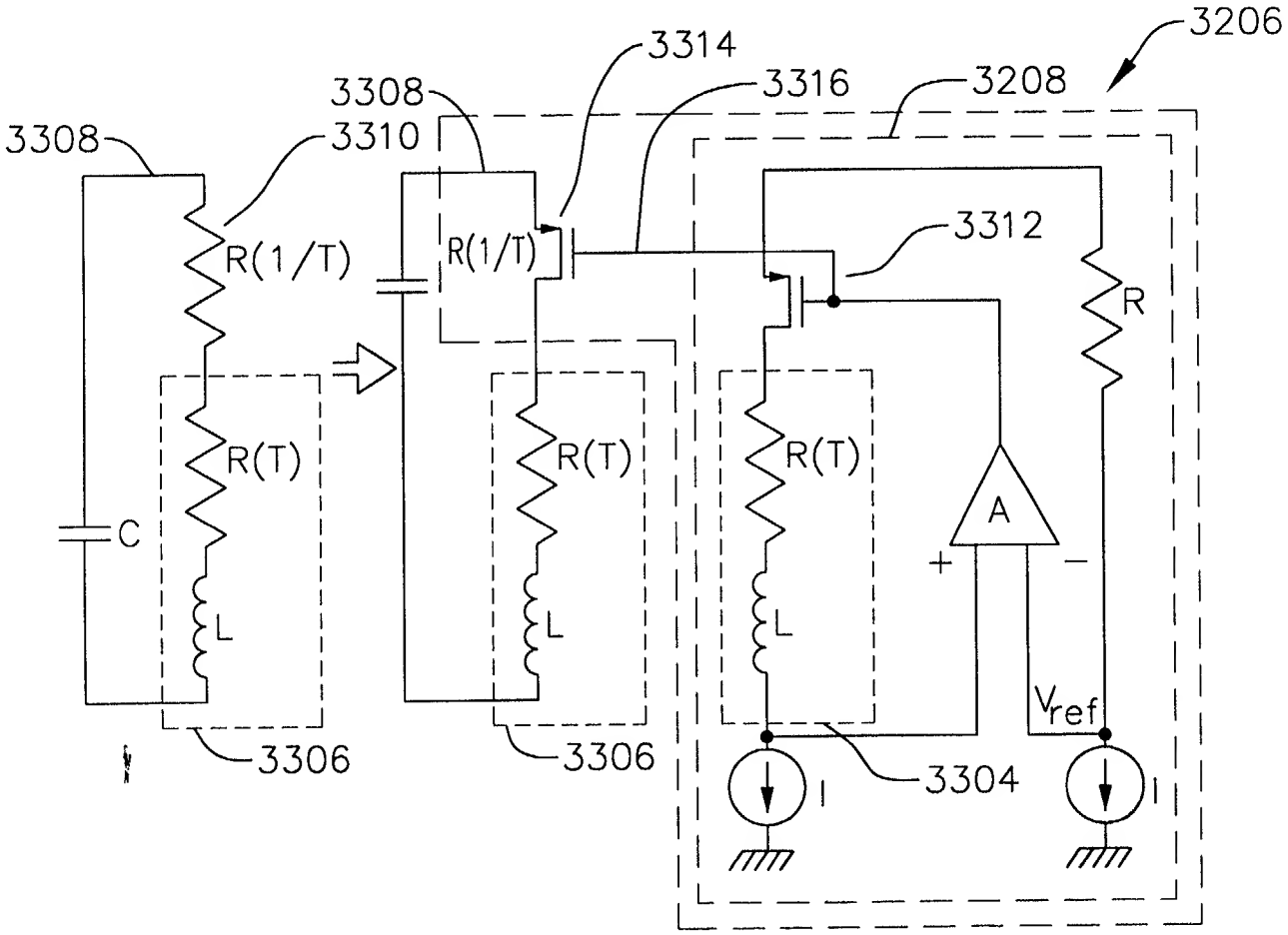


FIG.34

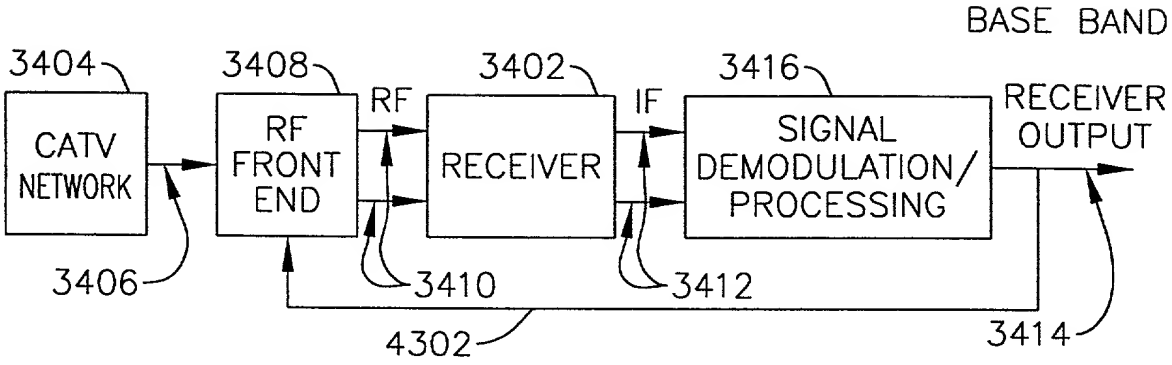

BASE BAND
3404
CATV NETWORK
3406
3408
RF FRONT END
RF
3402
RECEIVER
IF
3416
SIGNAL DEMODULATION/ PROCESSING
RECEIVER OUTPUT
3410
3412
4302
3414

FIG.35

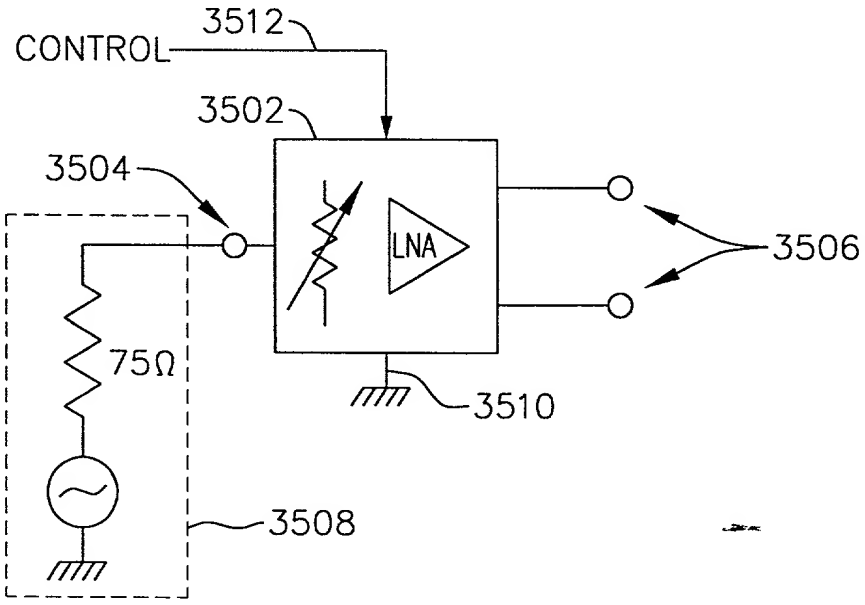

CONTROL
3512
3502
3504
LNA
3506
75Ω
3510
3508

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FIG.36

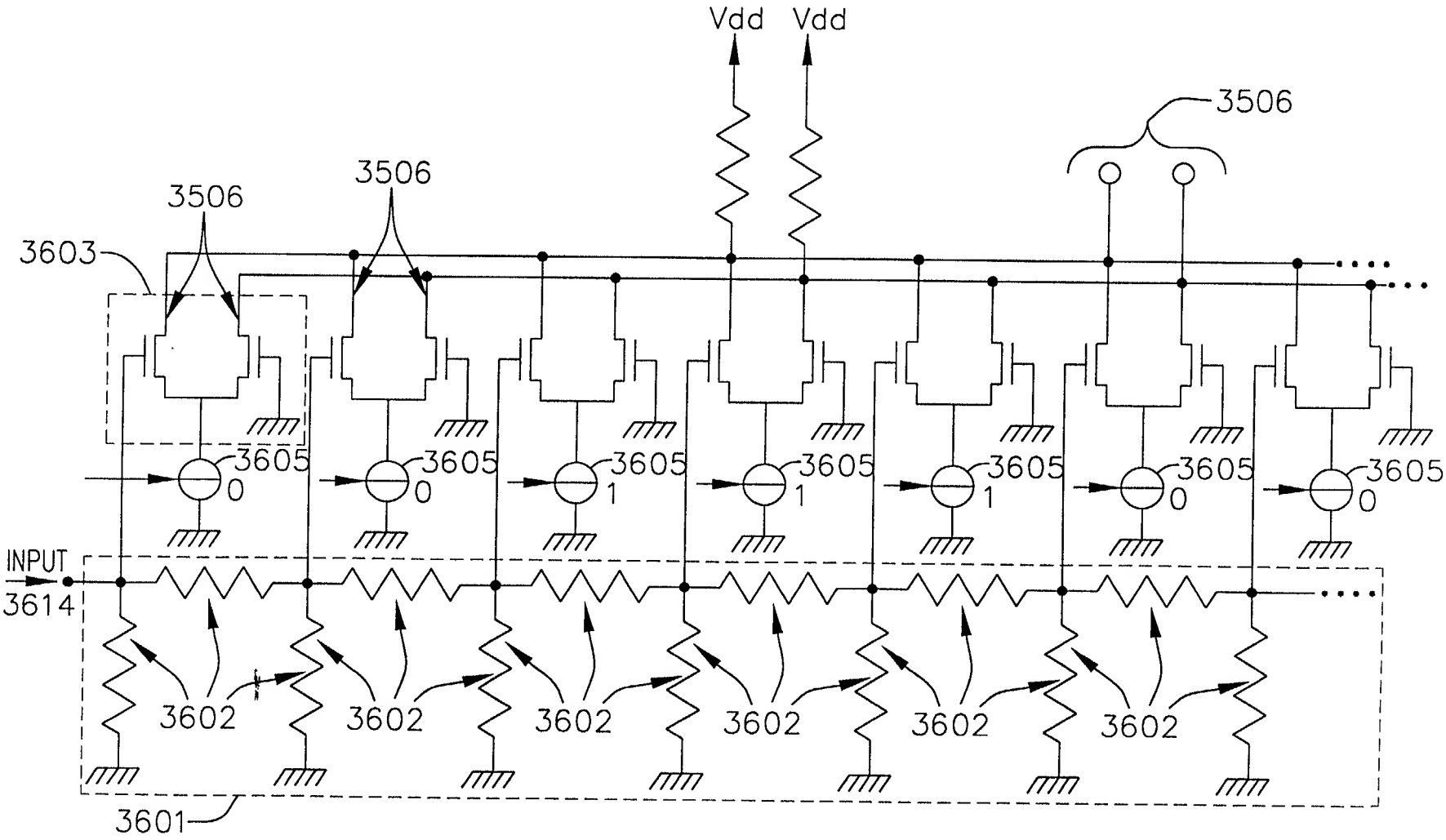

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FIG.37

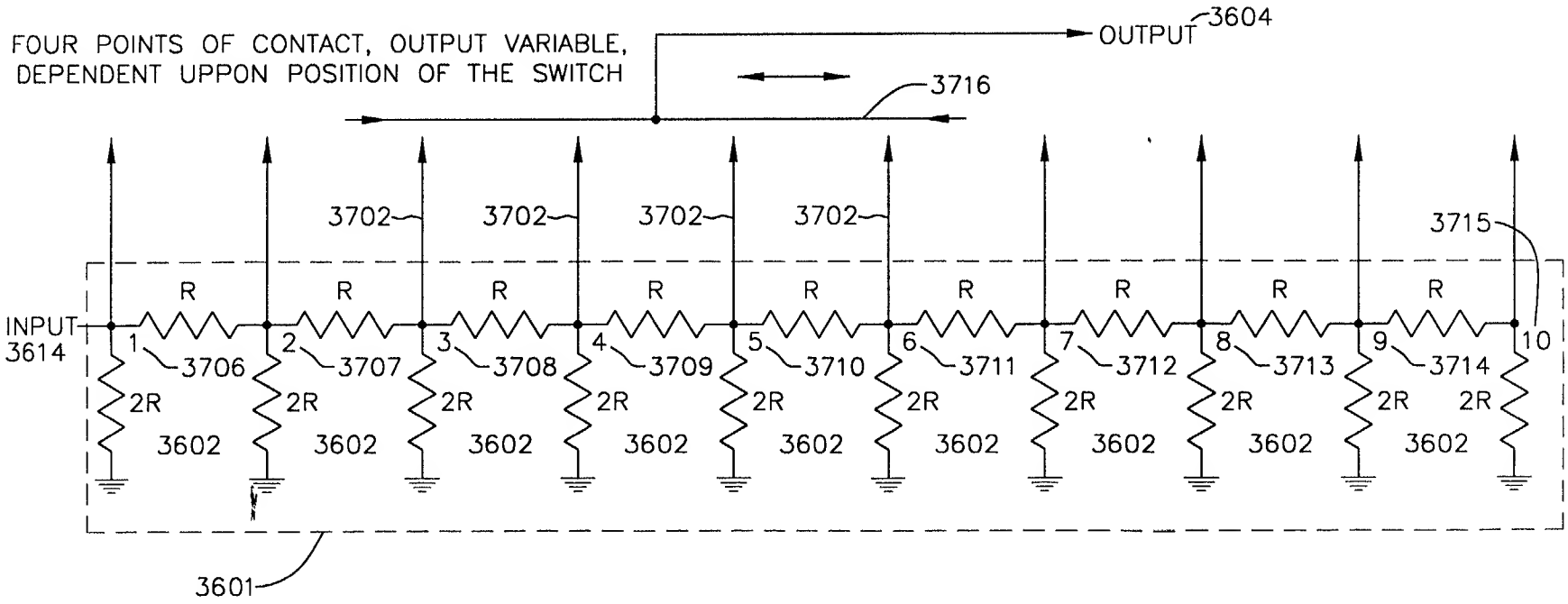

FIG.38

PGA SETTINGS

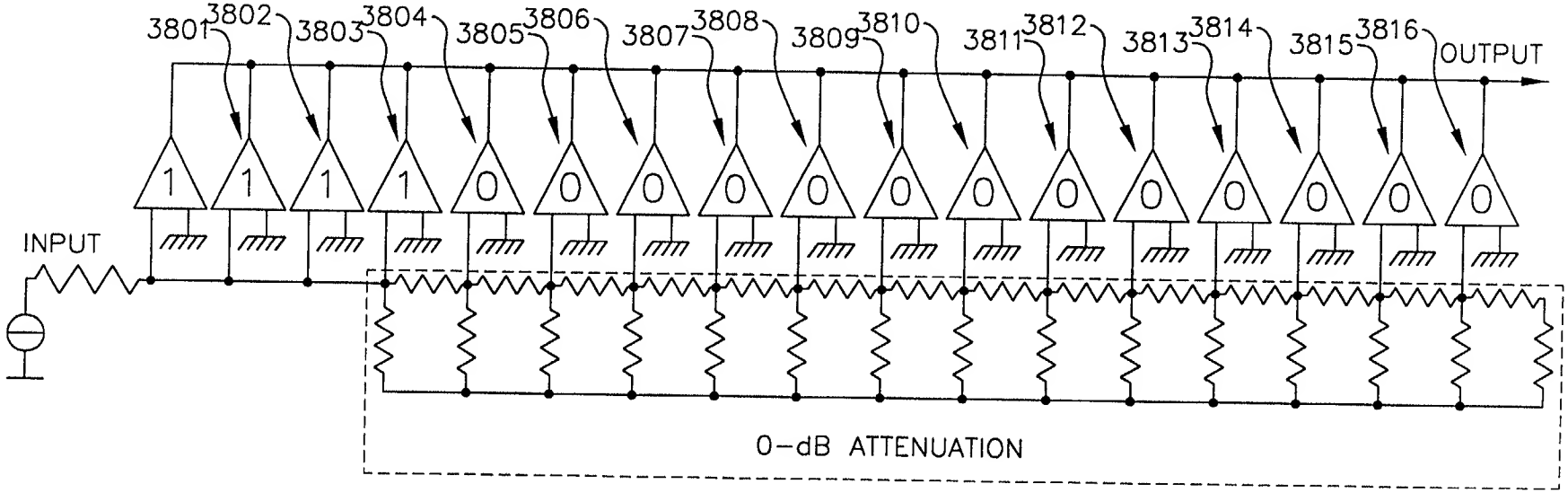

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FIG.39

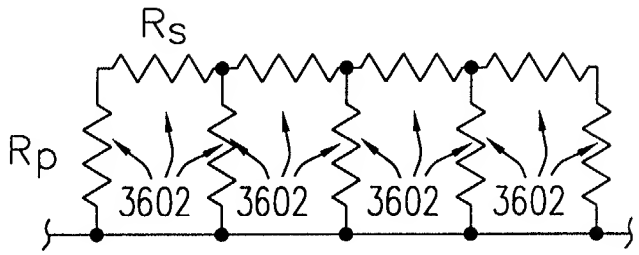

FIG.40

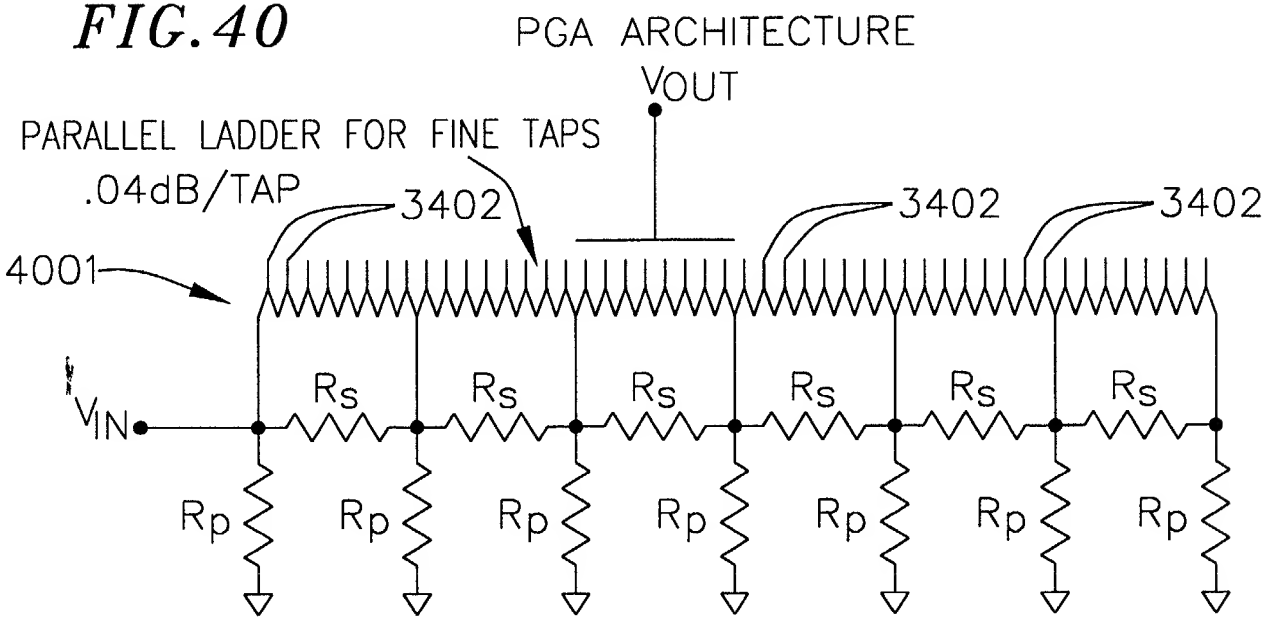

FIG. 41

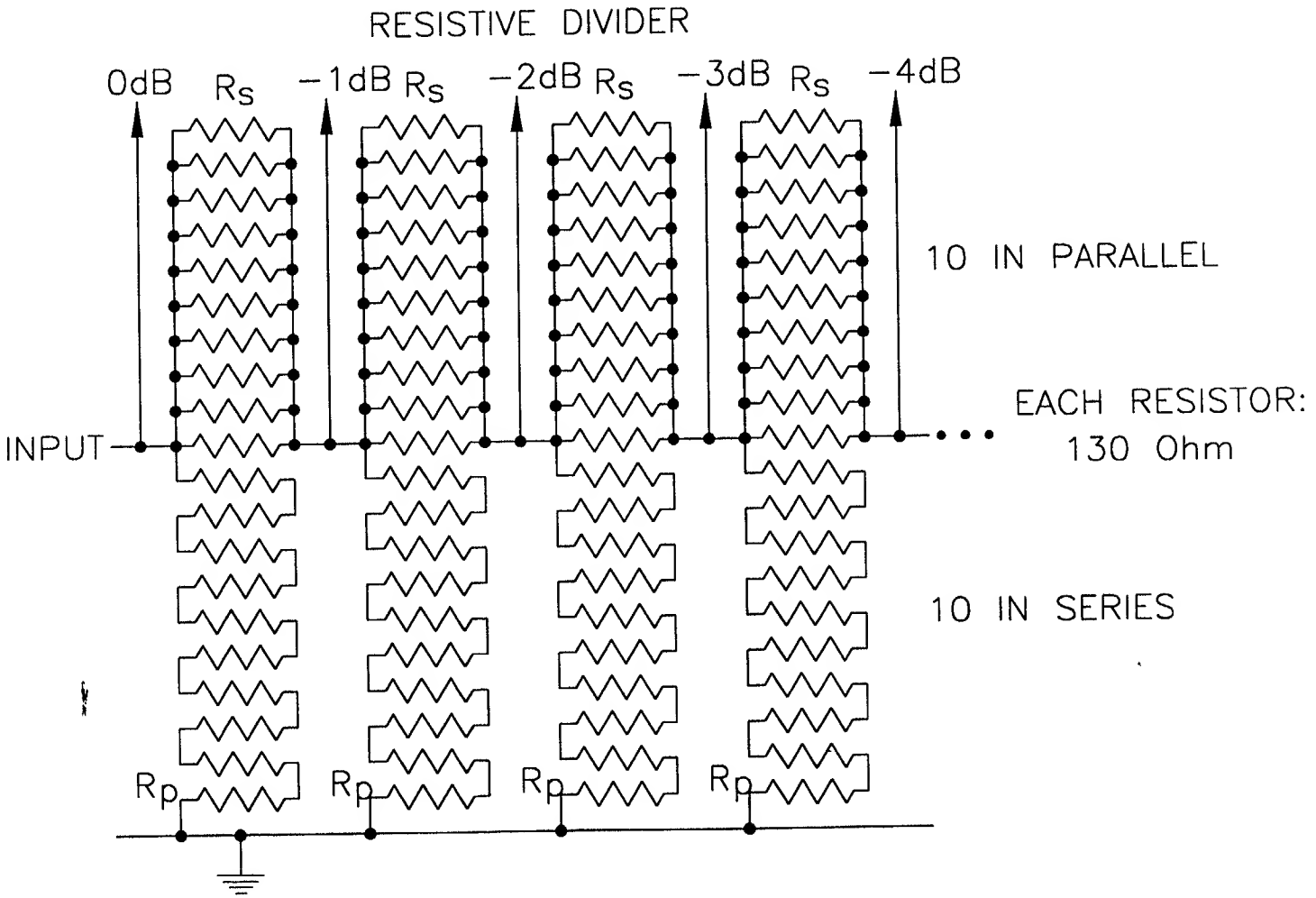
RESISTIVE DIVIDER
0dB
Rs
−1dB
Rs
−2dB
Rs
−3dB
Rs
−4dB
10 IN PARALLEL
EACH RESISTOR:
130 Ohm
INPUT
10 IN SERIES
Rp
Rp
Rp
Rp

FIG. 42

NON–MONOTONICITY

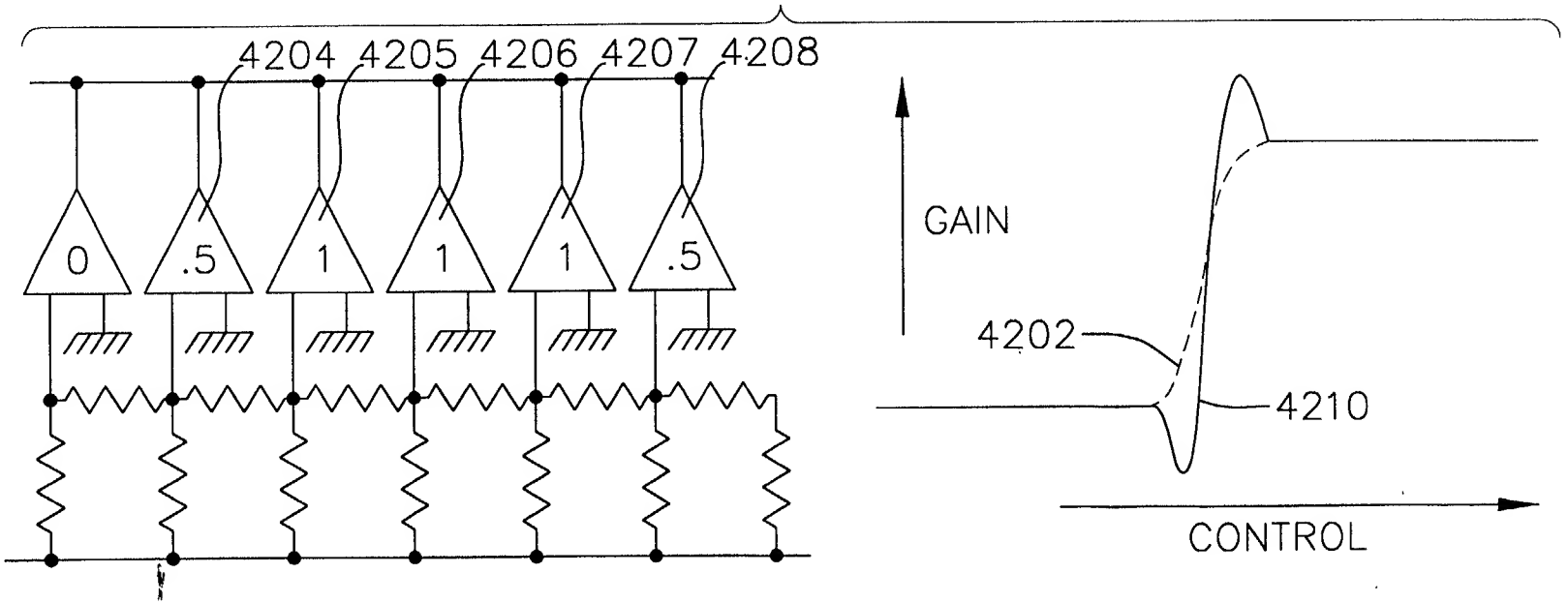

FIG. 43

CLAMPING CONTROL RANGE

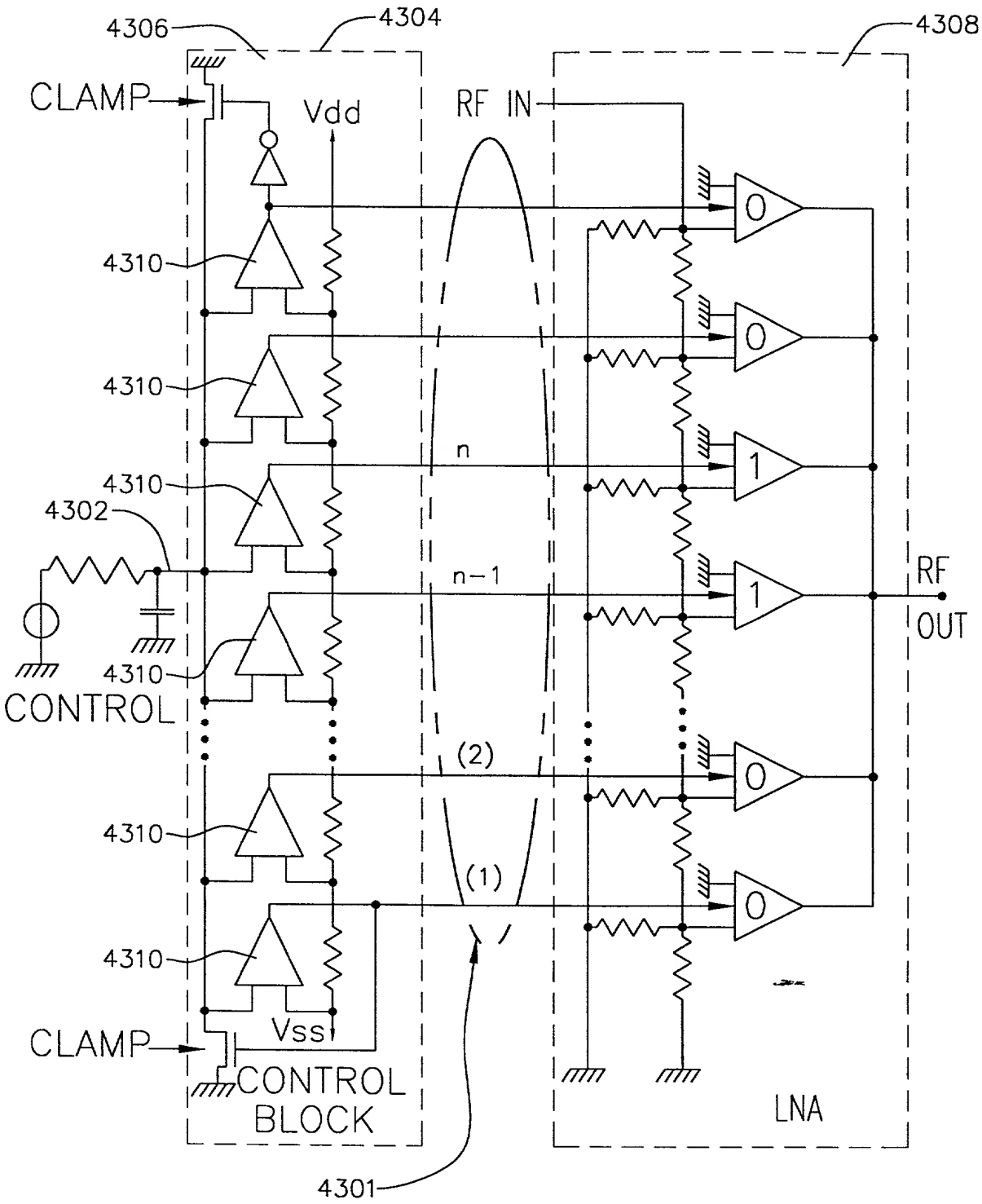

FIG.44a

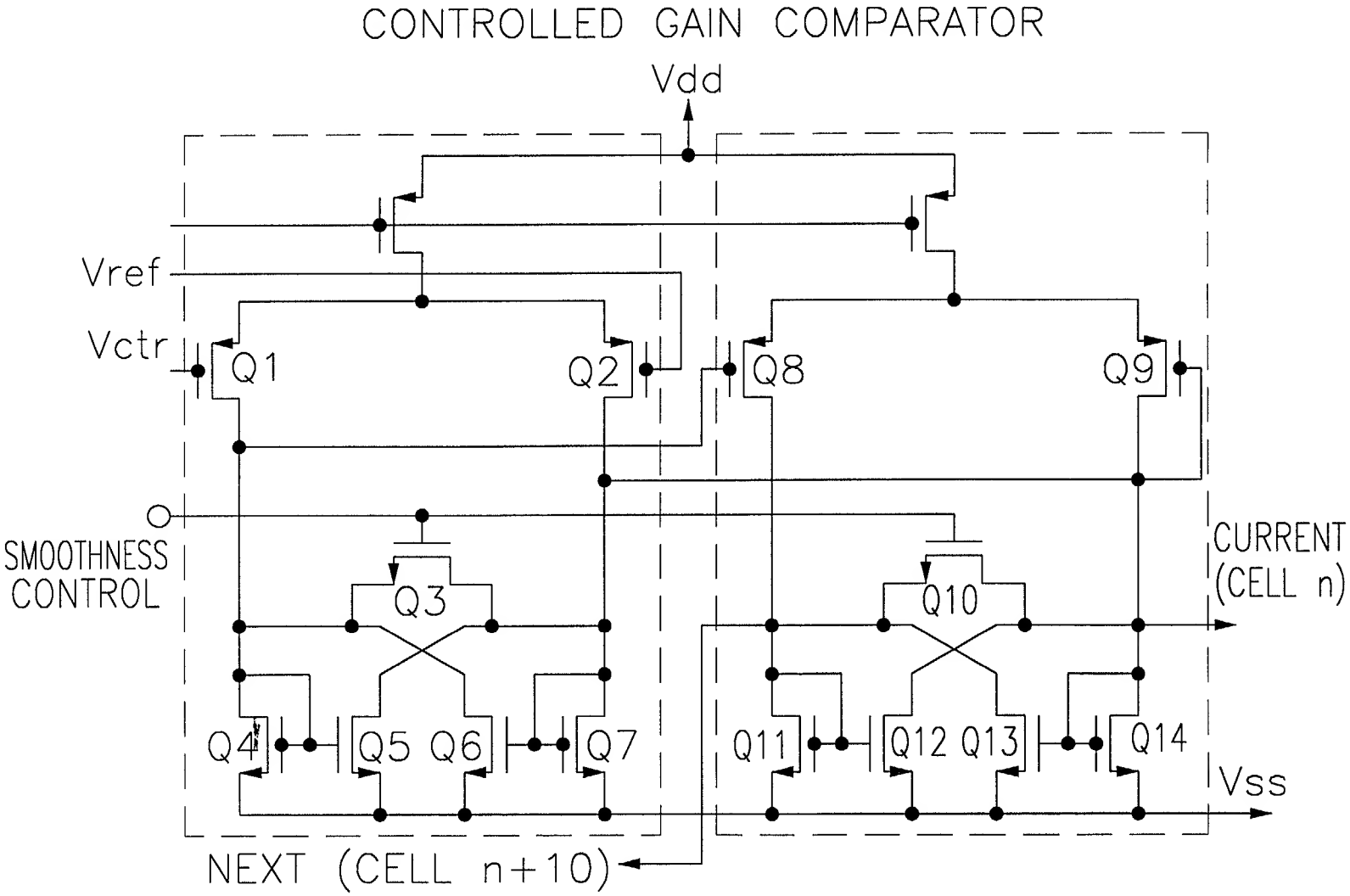
CONTROLLED GAIN COMPARATOR
Vdd
Vref
Vctr
Q1
Q2
Q8
Q9
SMOOTHNESS CONTROL
Q3
Q10
CURRENT (CELL n)
Q4
Q5 Q6
Q7
Q11
Q12 Q13
Q14
Vss
NEXT (CELL n+10)

FIG.44b

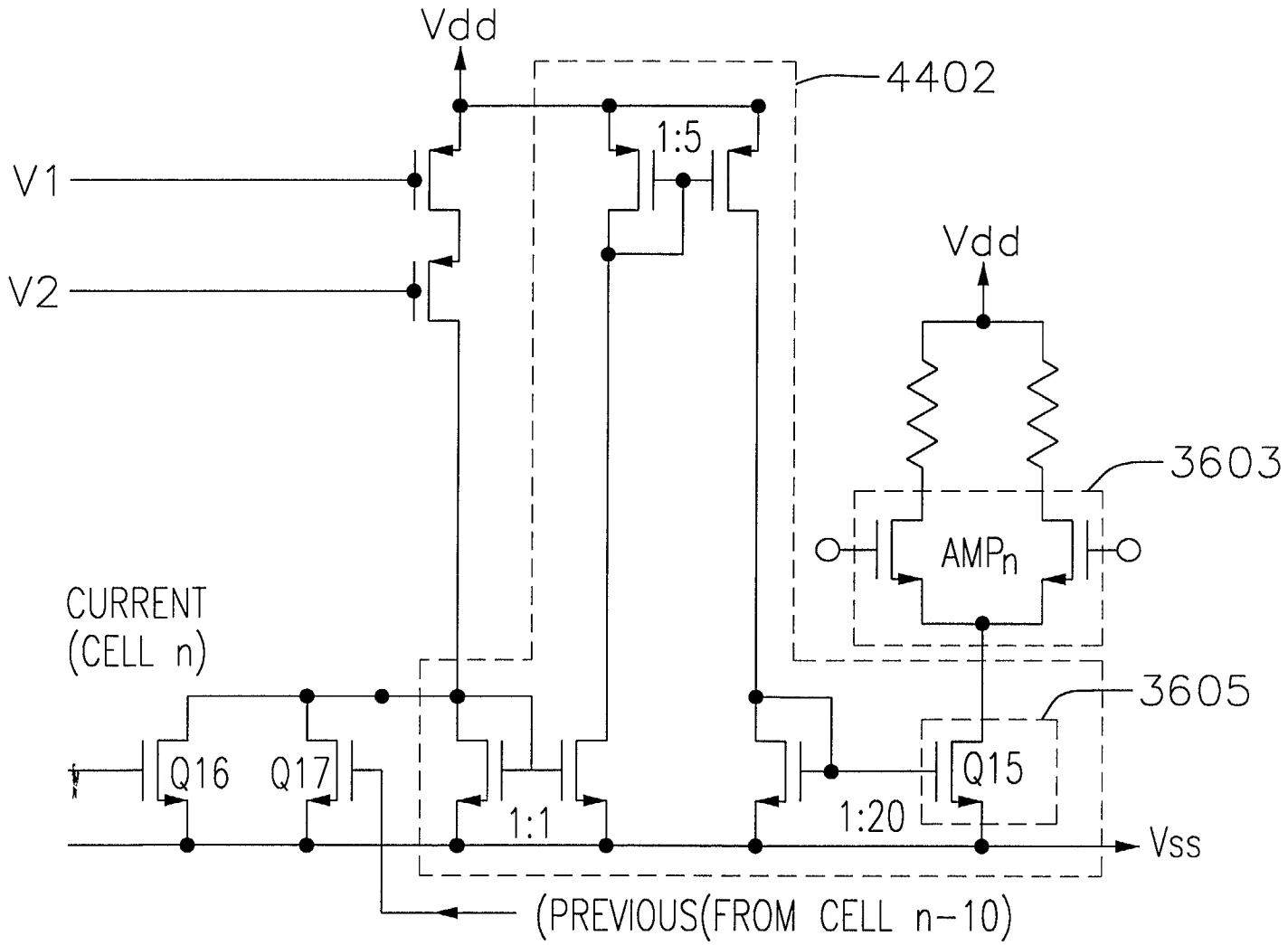
Vdd
4402
1:5
V1
V2
Vdd
3603
AMPn
CURRENT
(CELL n)
3605
Q16
Q17
Q15
1:1
1:20
Vss
(PREVIOUS(FROM CELL n-10)

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FIG. 45

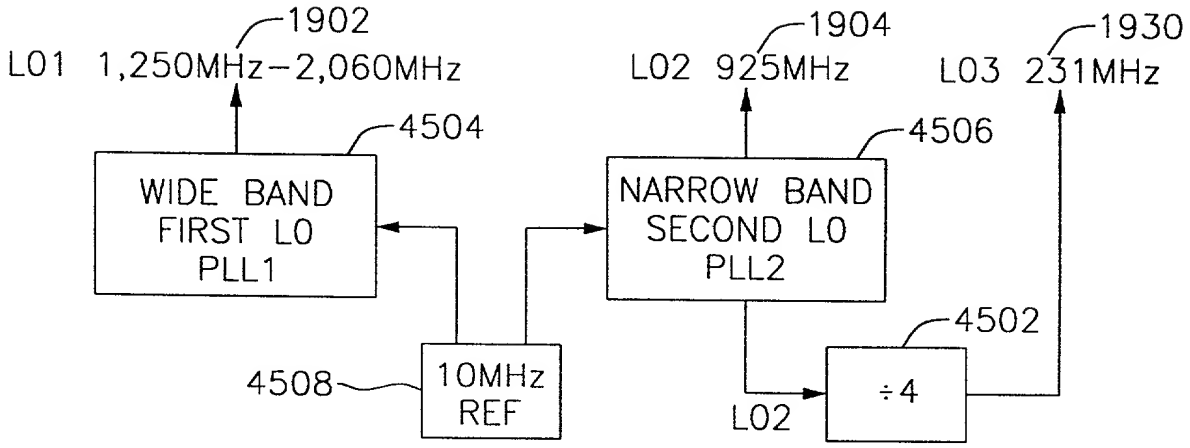
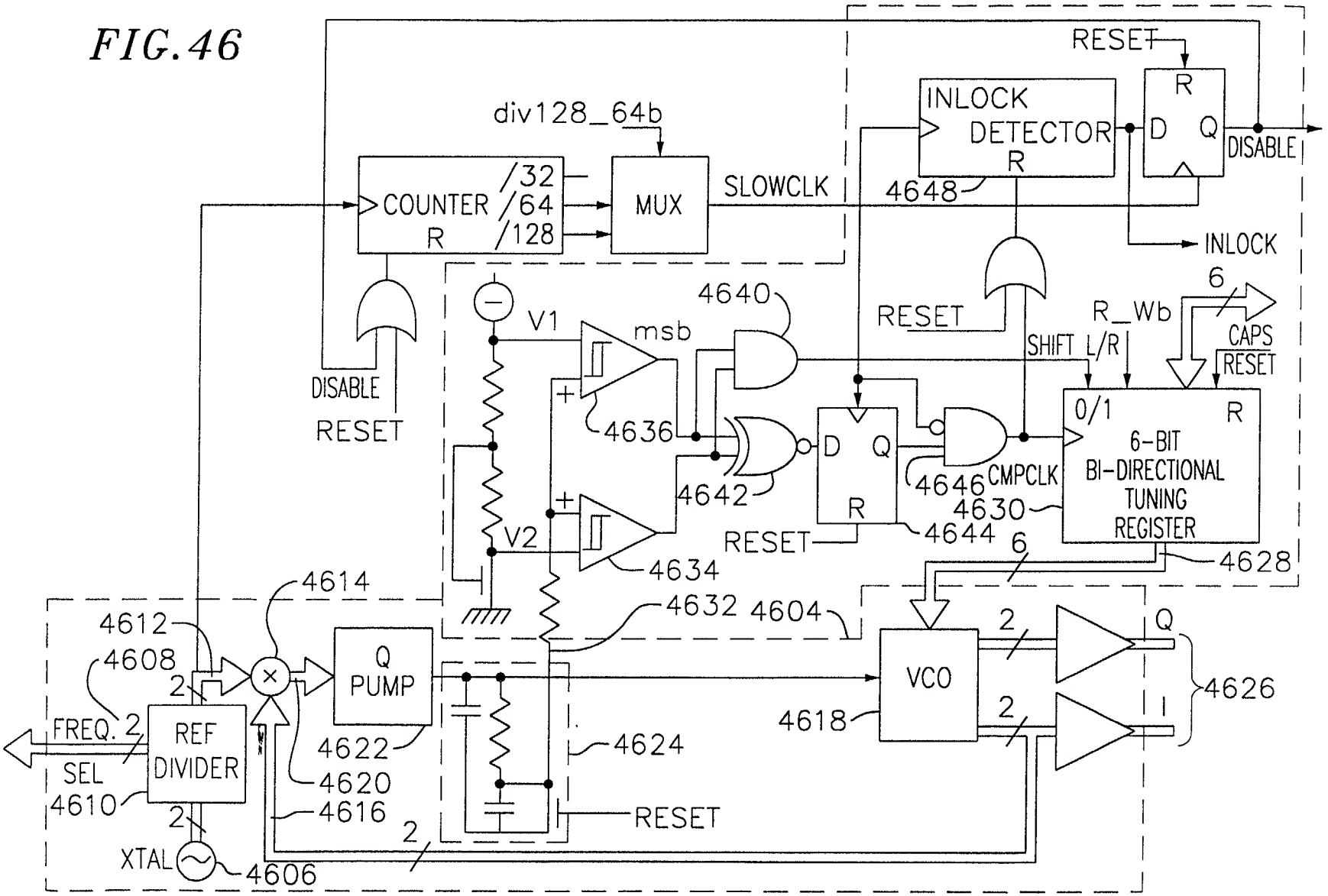


FIG. 46


RESET
INLOCK DETECTOR
R
D Q
DISABLE
div128_64b
COUNTER
/32
/64
/128
R
MUX
SLOWCLK
4648
INLOCK
6
R_Wb
CAPS RESET
SHIFT L/R
RESET
4640
V1
msb
4636
4642
V2
4634
D Q
R
RESET
4644
CMPCLK
4646
4630
0/1
R
6-BIT BI-DIRECTIONAL TUNING REGISTER
4628
6
DISABLE
RESET
4614
4612
4608
4632
4604
VCO
2
Q
4626
4618
Q PUMP
4622
4624
4620
4616
RESET
FREQ. 2
SEL
4610
REF DIVIDER
XTAL
4606

FOGTTO" 9409260

FIG. 47

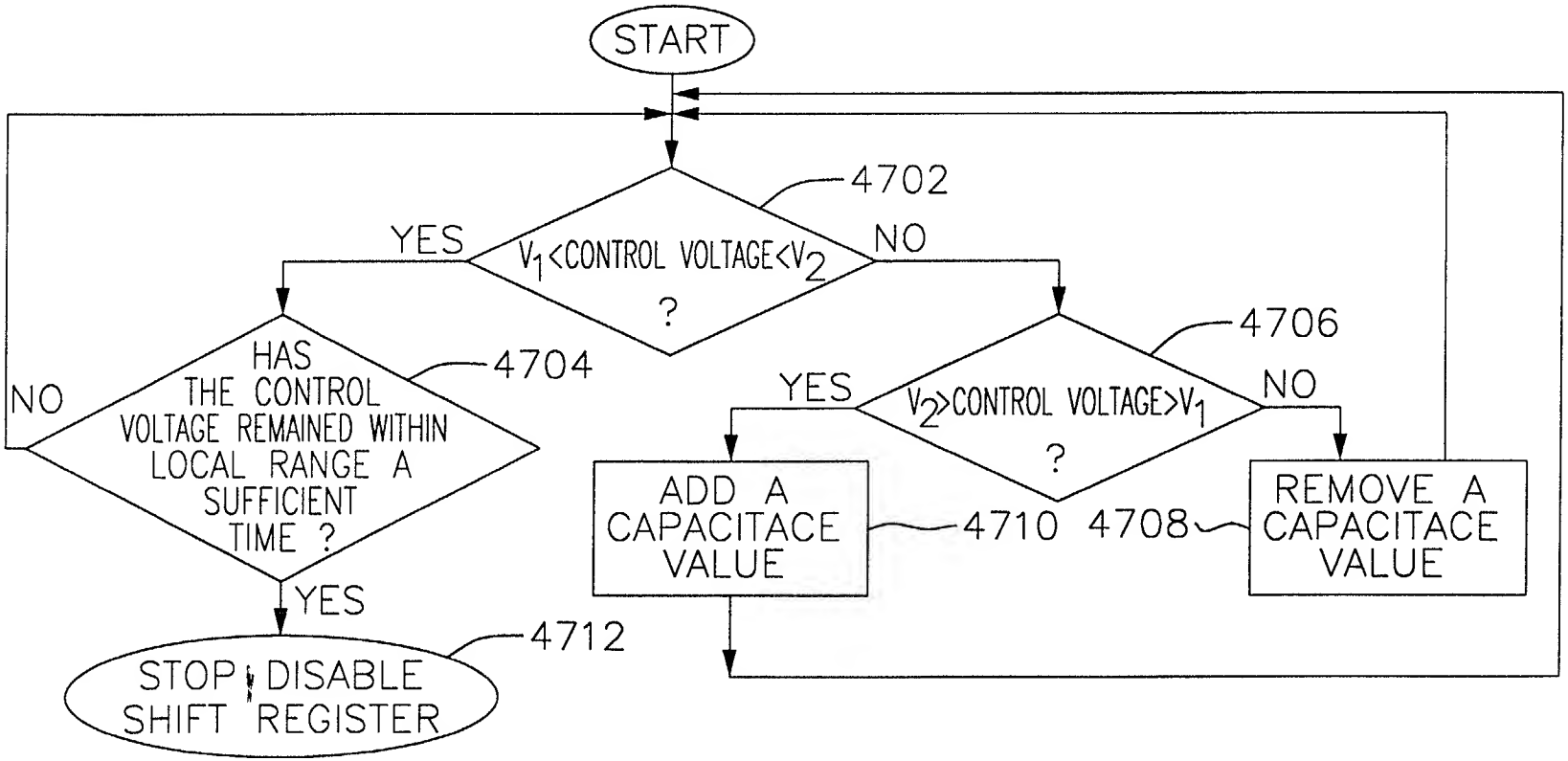


FIG.48

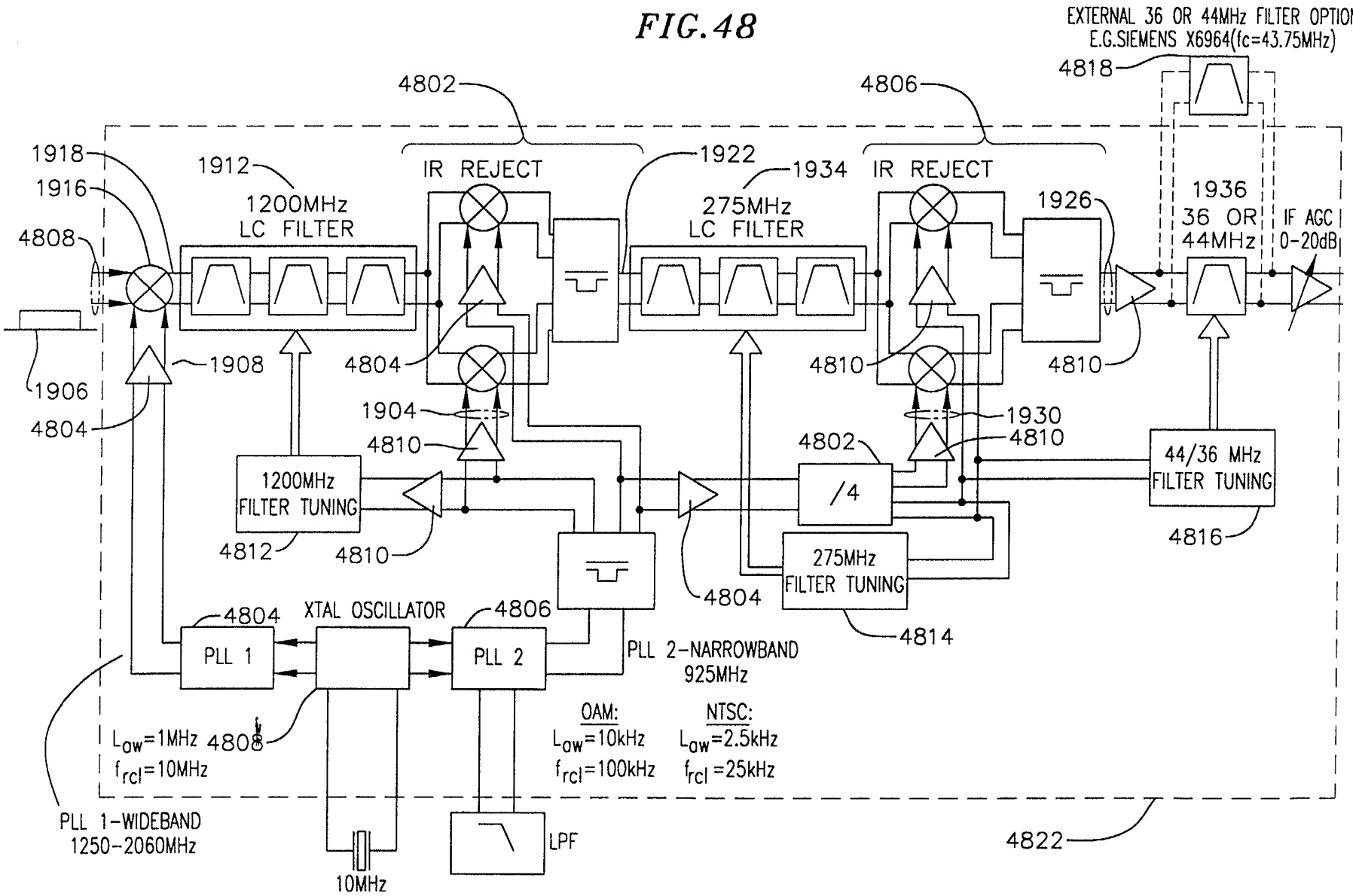
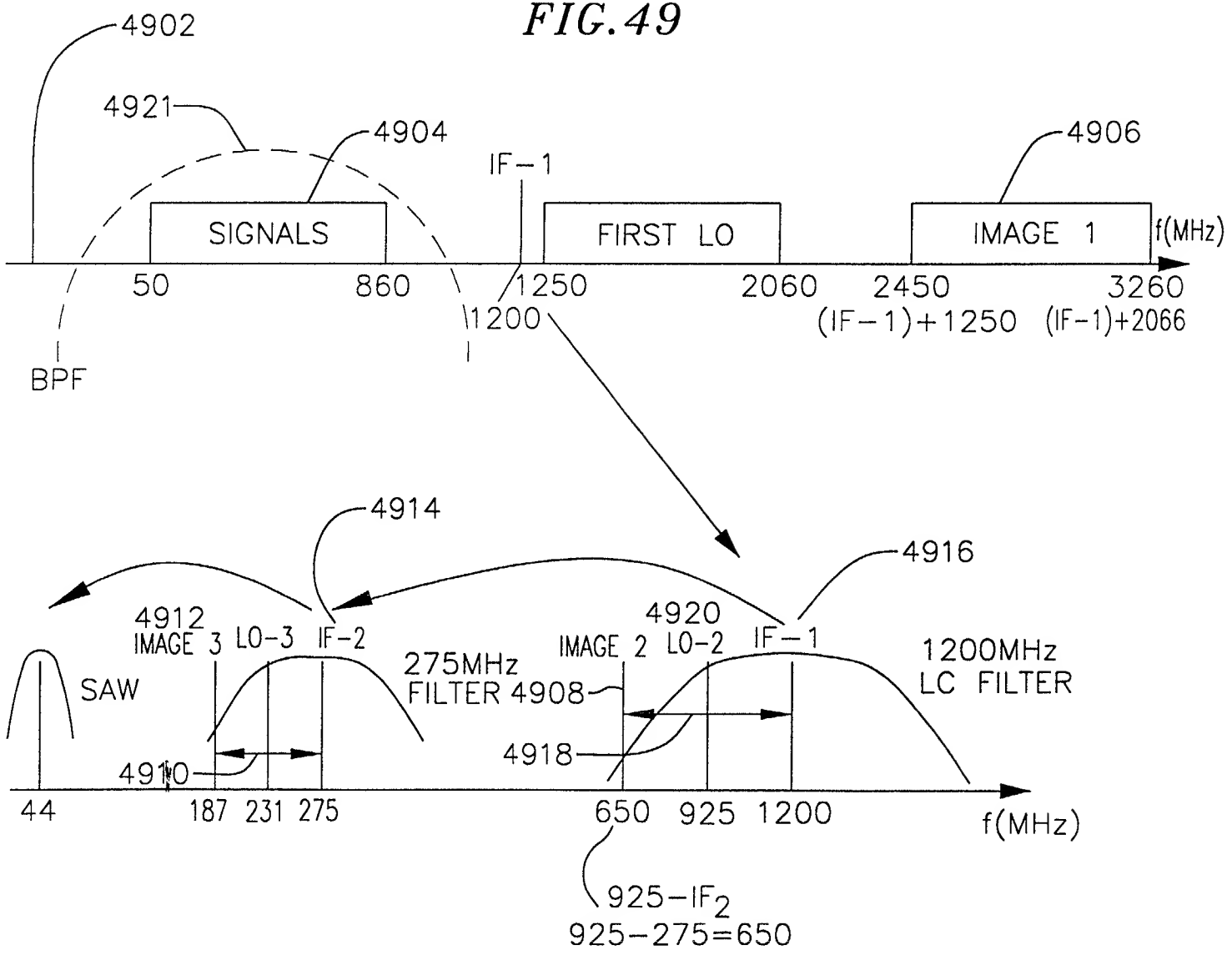
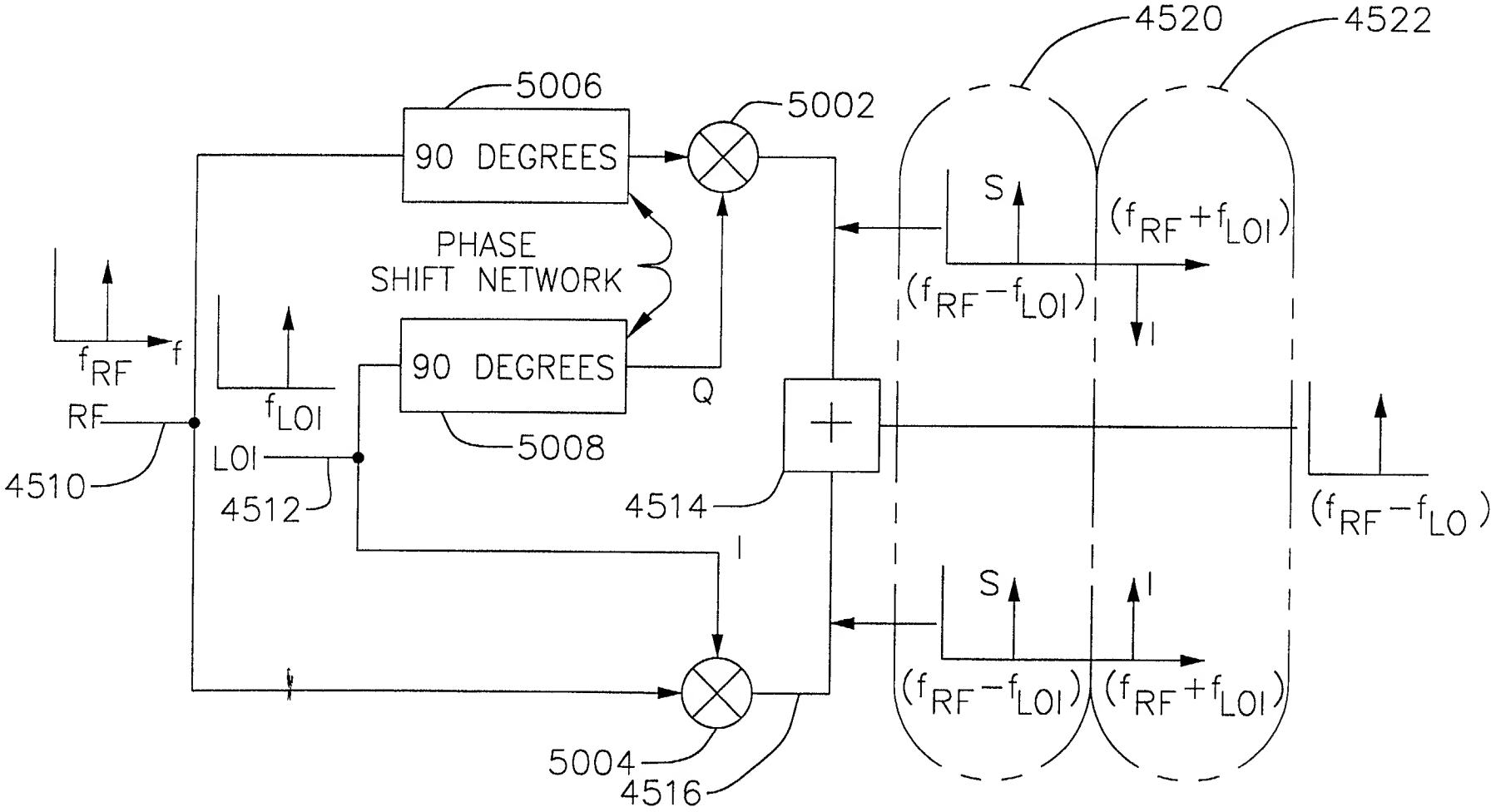

EXTERNAL 36 OR 44MHz FILTER OPTION
E.G.SIEMENS X6964(fc=43.75MHz)
4818
4802
4806
1918
1916
1912
1200MHz
LC FILTER
IR REJECT
1922
1934
275MHz
LC FILTER
IR REJECT
1926
1936
36 OR
44MHz
IF AGC
0-20dB
4808
1906
4804
1908
4804
4810
4810
4810
1904
1930
4810
4802
/4
1200MHz
FILTER TUNING
4812
4810
44/36 MHz
FILTER TUNING
4816
275MHz
FILTER TUNING
4814
4804
4804
XTAL OSCILLATOR
4806
PLL 1
PLL 2
PLL 2-NARROWBAND
925MHz
OAM:
Low=10kHz
frcl=100kHz
NTSC:
Low=2.5kHz
frcl=25kHz
Low=1MHz 4808
frcl=10MHz
PLL 1-WIDEBAND
1250-2060MHz
10MHz
LPF
4822

FIG.49


4902
4921
4904
IF-1
4906
SIGNALS
FIRST LO
IMAGE 1
f(MHz)
50
860
1250
2060
2450
3260
(IF-1)+1250
(IF-1)+2066
1200
BPF
4914
4916
4912
IMAGE 3 LO-3 IF-2
4920
IMAGE 2 LO-2 IF-1
1200MHz
LC FILTER
SAW
275MHz
FILTER 4908
4918
4910
44
187 231 275
650 925 1200
f(MHz)
925-IF2
925-275=650

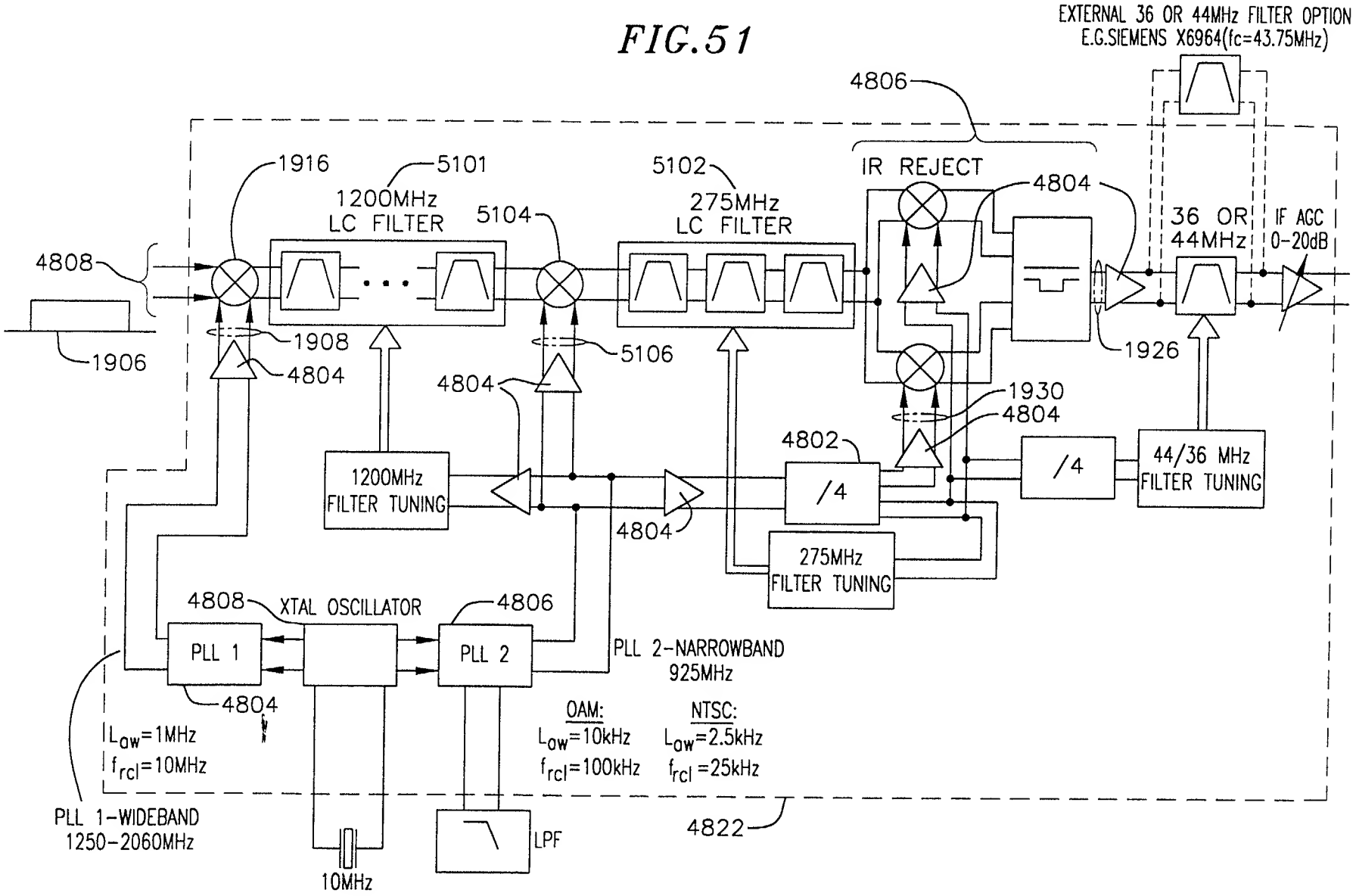
FOSTER 8H099260

FIG.50



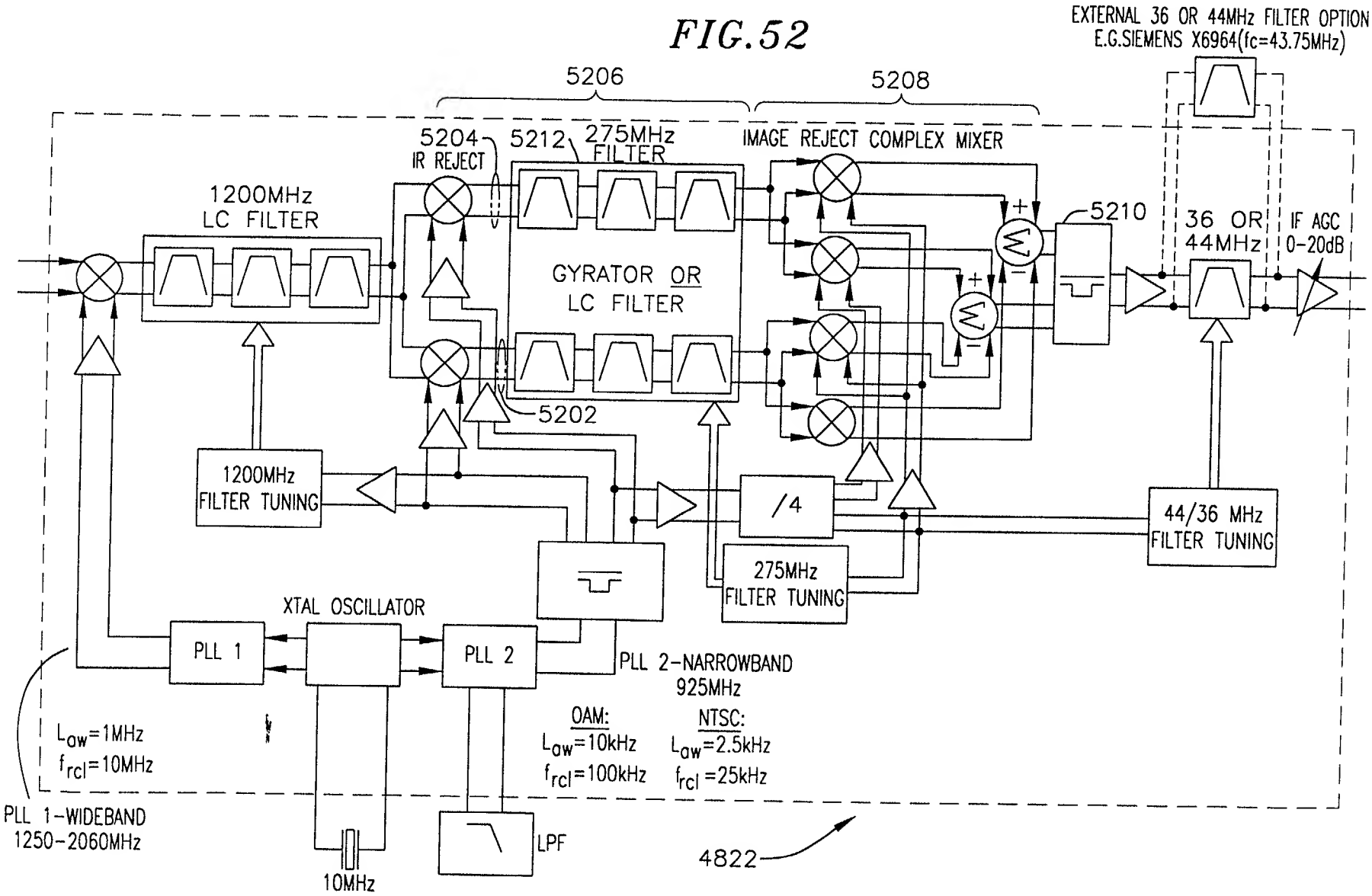
EP 0 678 990 A2

FIG.51



TOSTO" 84099260

FIG.52



TOSTO" 8hD99260

FIG.53

CATV TUNER

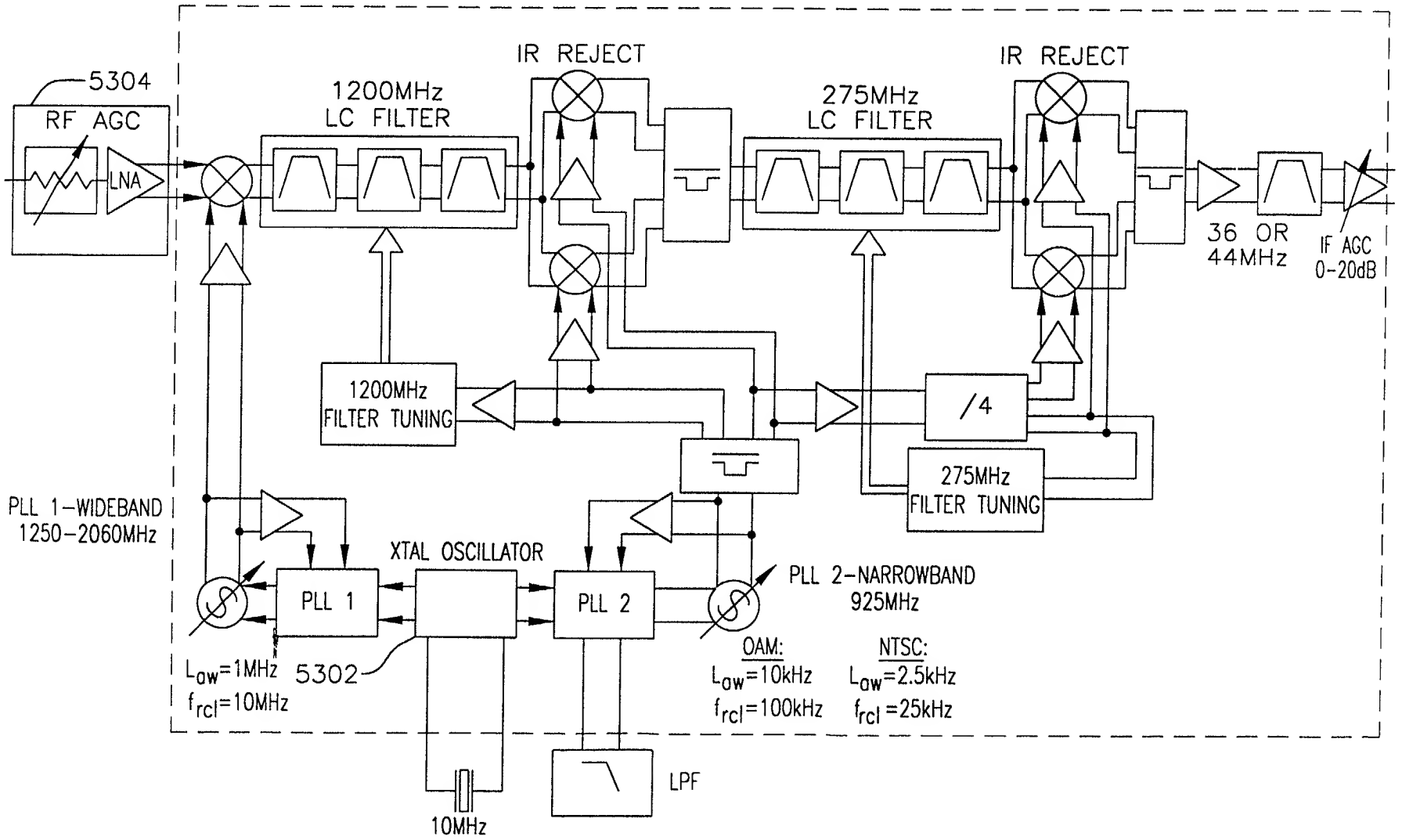
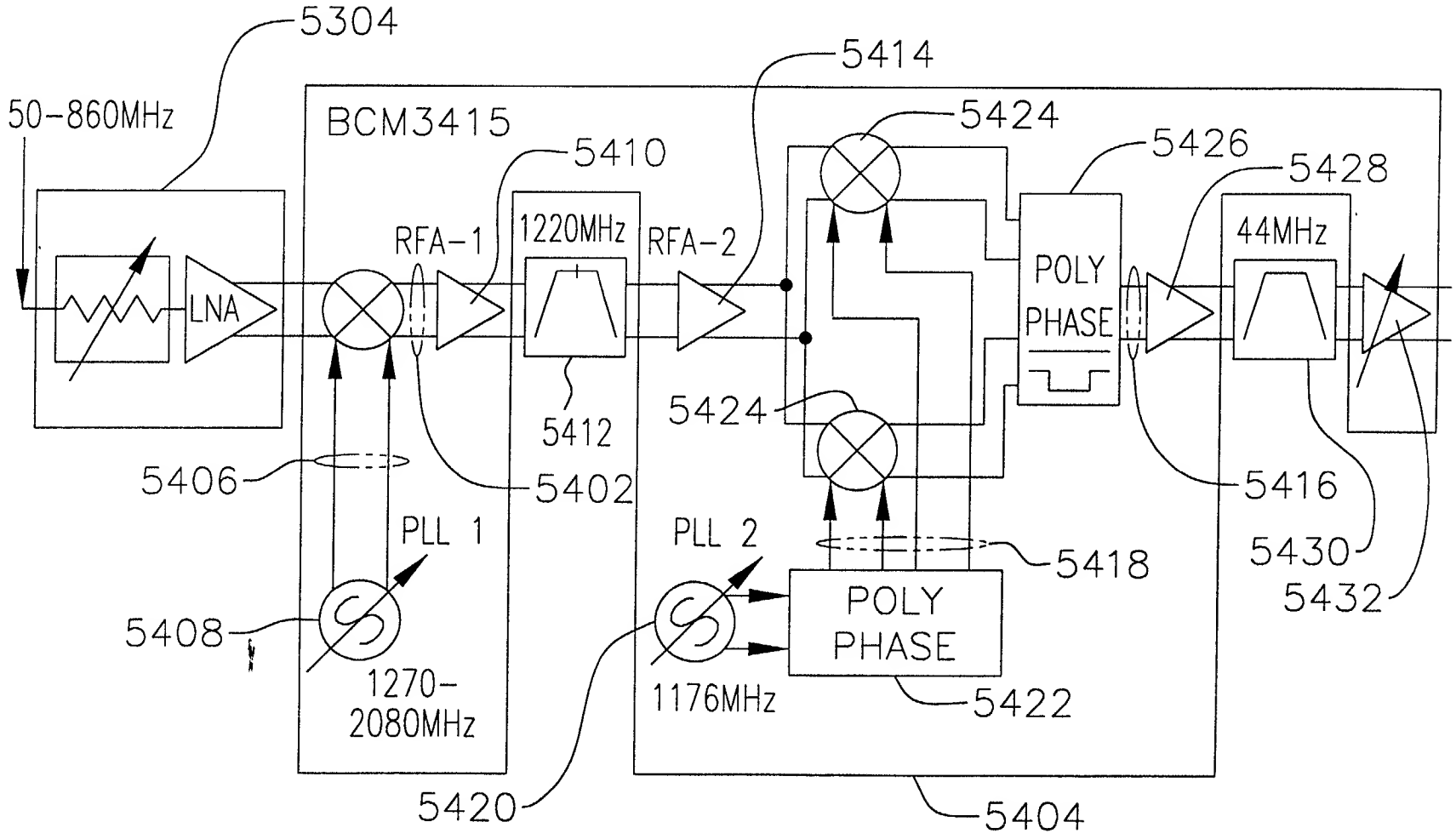


FIG.54


5304
50-860MHz
BCM3415
5414
5424
5426
5428
5410
RFA-1
1220MHz
RFA-2
POLY
PHASE
44MHz
LNA
5412
5424
5406
5402
5416
PLL 1
PLL 2
5418
5430
5432
5408
POLY
PHASE
1270-
2080MHz
1176MHz
5422
5420
5404

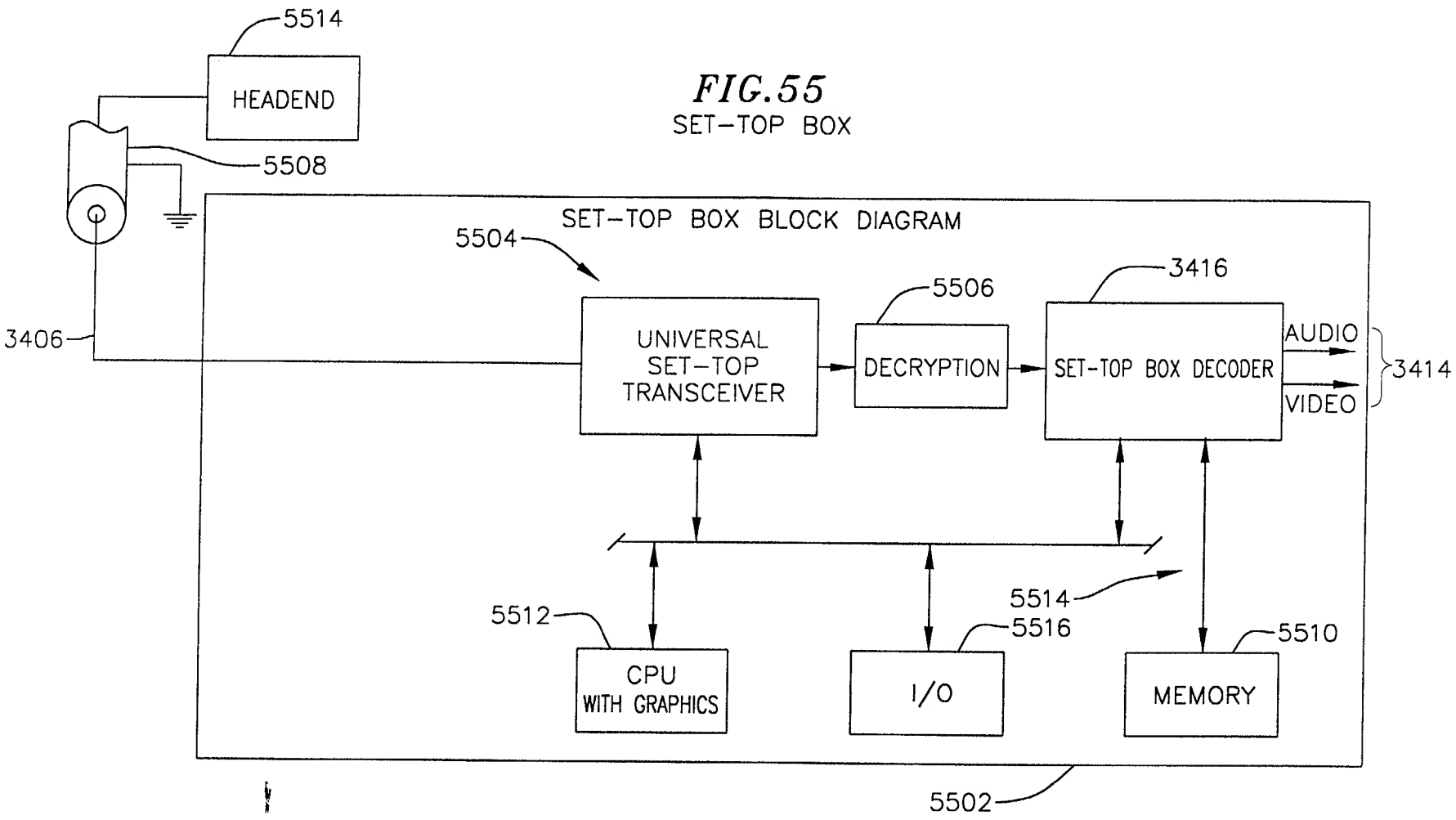
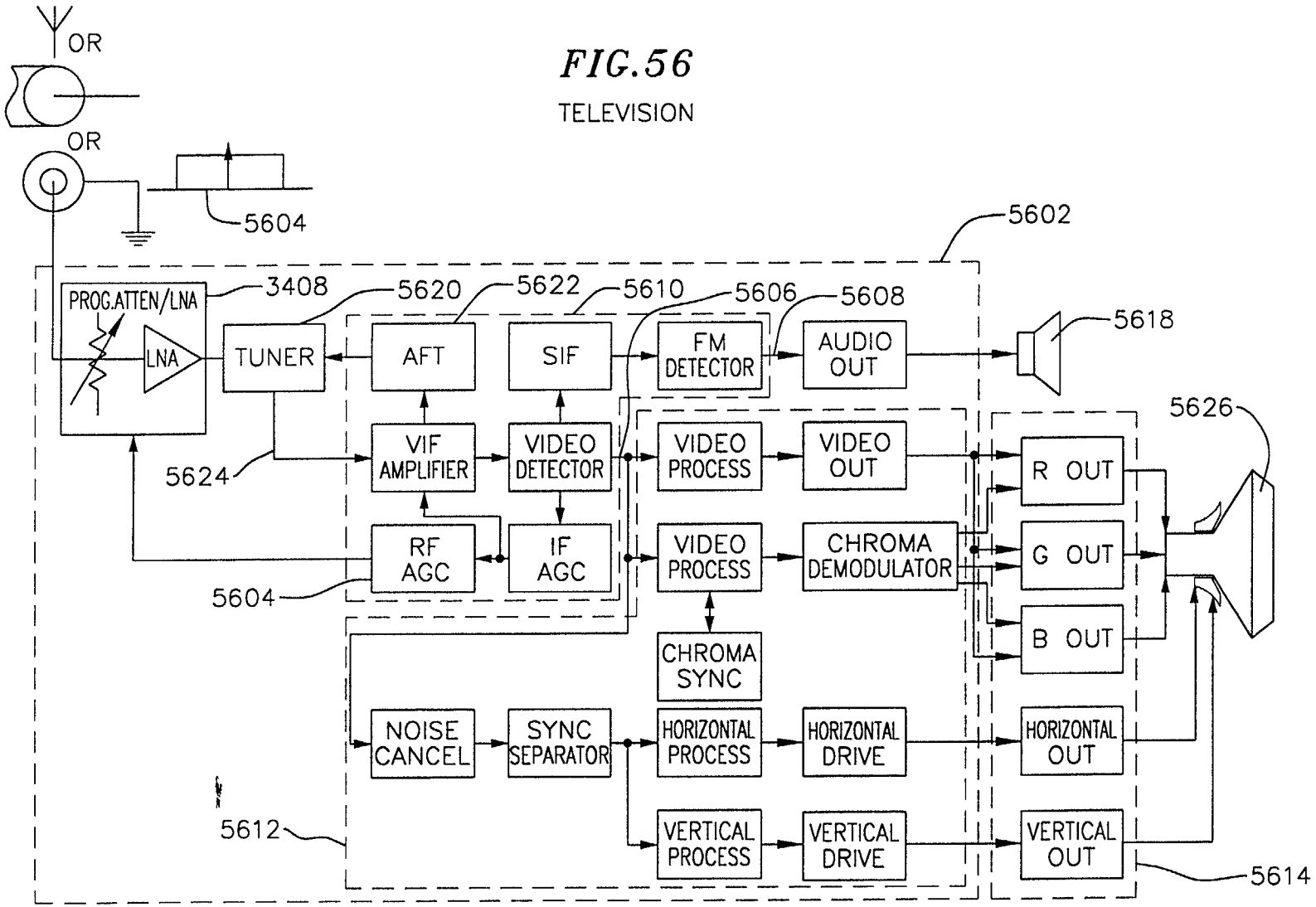


FIG.55
SET-TOP BOX

TOGETO"84099260

FIG.56

TELEVISION



TOSHIBA 94099260

FIG.57

VCR BLOCK DIAGRAM

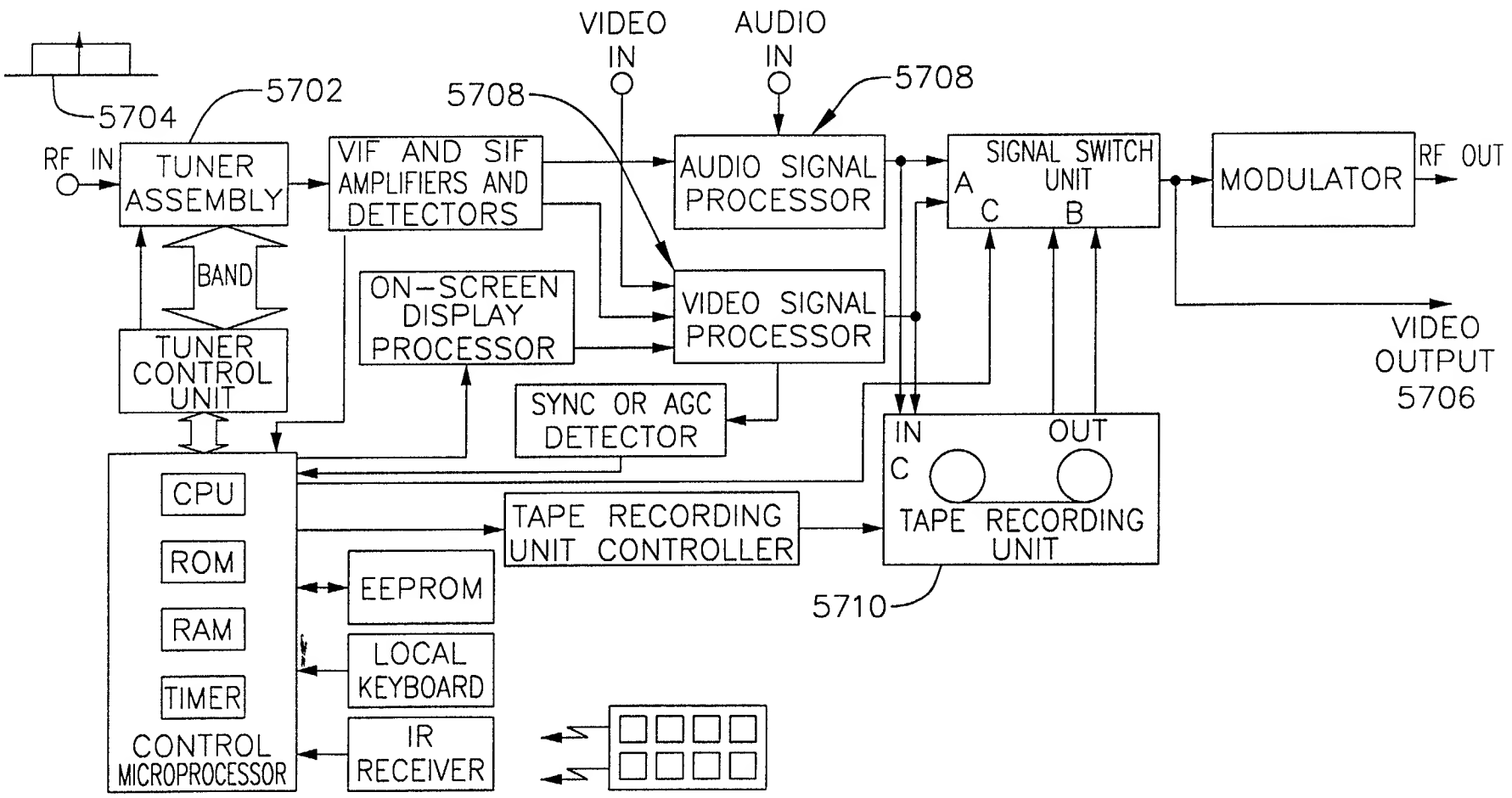
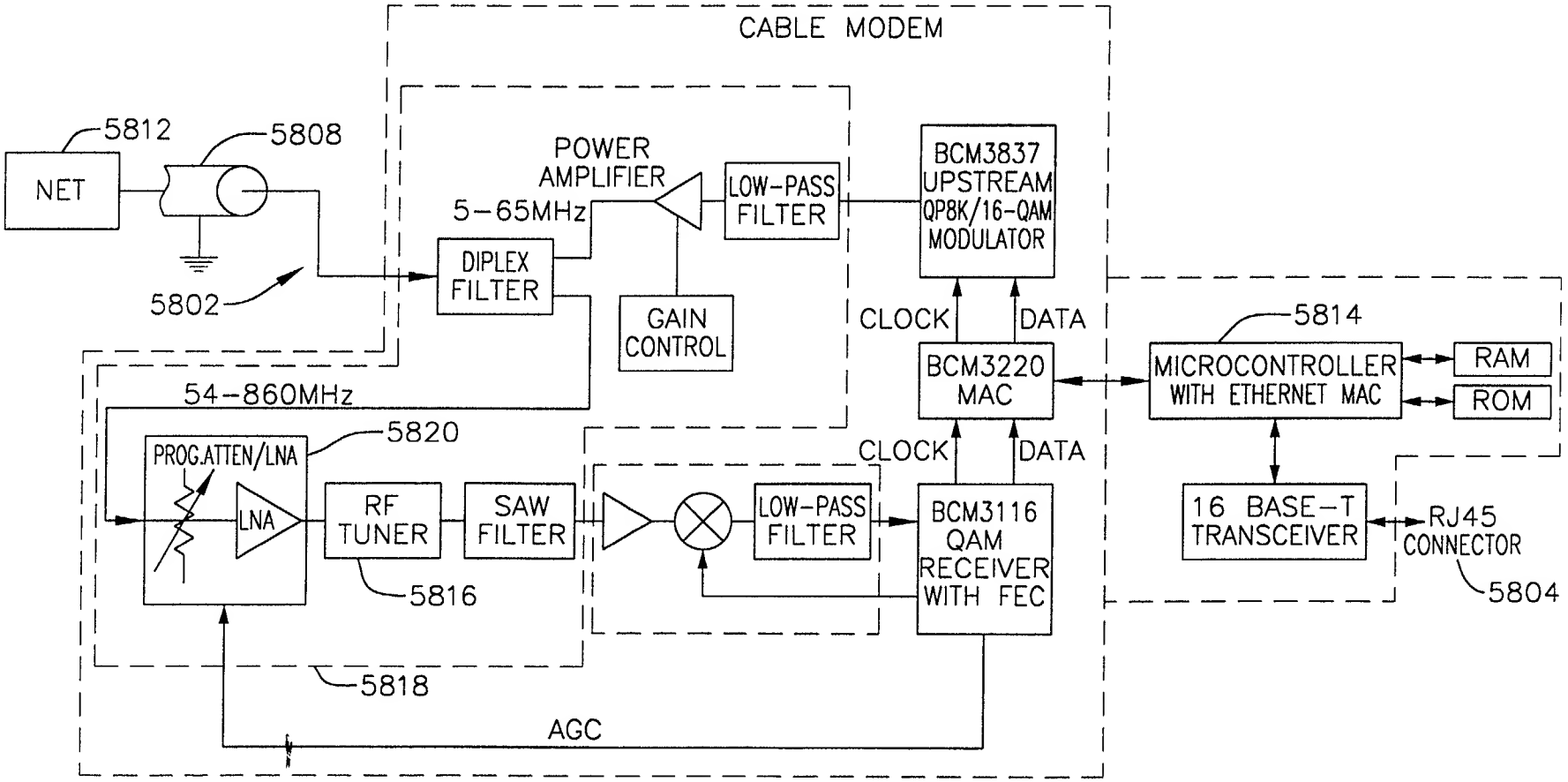


FIG.58


CABLE MODEM
5812
5808
NET
5802
POWER AMPLIFIER
5-65MHz
LOW-PASS FILTER
DIPLEX FILTER
GAIN CONTROL
BCM3837 UPSTREAM QP8K/16-QAM MODULATOR
CLOCK
DATA
5814
BCM3220 MAC
MICROCONTROLLER WITH ETHERNET MAC
RAM
ROM
54-860MHz
5820
PROG.ATTEN/LNA
LNA
RF TUNER
SAW FILTER
LOW-PASS FILTER
BCM3116 QAM RECEIVER WITH FEC
16 BASE-T TRANSCEIVER
RJ45 CONNECTOR
5816
5804
5818
AGC